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McCLEAN (A. P. D.). **Bunchy top disease of the Tomato.**—*S. Africa Dept. of Agric., Sci. Bull.* 100, 28 pp., 8 pl., 1931.

This is the full account of the bunchy top disease of the tomato in South Africa, a brief abstract of which has been noticed from another source [*R.A.M.*, xi, p. 209]. The trouble is stated to be more or less generally distributed throughout the low-lying districts of the eastern Transvaal, but has not been so far reported from outside this area. Macroscopically it closely resembles the American curly top of tomato described by Chupp ('Manual of vegetable garden diseases,' p. 597), but is quite distinct from yellows [ibid., xi, p. 210]. The most characteristic symptoms are severe stunting of the entire plant, a necrosis of the stems and leaves, and various forms of leaflet distortion, such as curling and abnormal unevenness of the surface. Under certain conditions the leaves may unfold in a partially chlorotic state, but later the foliage rapidly assumes a uniform green colour; mosaic mottling was never observed either in the field or in the greenhouse. A peculiar feature of the disease is that the check caused by it to the elongation of the internodes is limited to the early stages of infection; this is followed by a definite lengthening of the internodes with a somewhat spindling type of growth, the resulting plants showing three well-differentiated regions, namely, an apparently normal lower region, a middle region characterized by the condensation of the axis, and an apical region with elongated thin internodes and small leaves. Necrosis, which is characterized by the appearance of brown or black streaks along the under surface of the rachis and leaflet veins and on the stems, is chiefly a symptom of the early stages of the disease; it develops with greatest severity on the leaves showing the first signs of stunting, and diminishes towards the upper portions of the plant. Diseased plants produce apparently normal flowers, and the setting of the fruit is not inhibited, but the yield is considerably reduced and the tomatoes that reach maturity are small and frequently distorted; these fruits are either seedless or contain a few small seeds, only a proportion of which may be fertile. Fruits that are formed before infection of the plant are not appreciably affected. It was shown that the disease develops in its most typical and severe form under environmental conditions which favour vigorous growth of the healthy plant.

The disease was readily transmitted to healthy tomato plants by grafting, juice inoculation, and by rubbing the leaves and stems with macerated tissue of diseased plants, but inoculation of the roots consistently failed to give positive results, and a limited number of tests of seed and soil transmission also failed. So far no insect vector of the disease has been demonstrated in the author's tests, but their agency in transmission is not excluded. The infectious principle was shown to be generally distributed throughout the whole plant, including the roots, with the exception of the old, outwardly normal leaves; it was apparently removed by passage through a paper pulp filter which allowed ordinary tobacco mosaic to pass freely. Attempts to transmit the disease to tobacco (Joiner variety) by grafting or leaf mutilation gave negative results, but it was successfully transferred to *Physalis peruviana* and back to tomato.

It is thought probable that the main source of infection in the field is the presence of diseased tomato plants of previous crops, and possibly of Solanaceous weeds, e.g., *Physalis*. Normally, the incidence of the disease in the field is low; the comparatively few serious outbreaks so far reported have been localized, and are believed to have been due either to seed-bed infection or accidental contamination of the seedlings during transplanting. The paper terminates with some recommendations for the control of the trouble.

STRZAŁKOWSKA (HALINA). **Zgnilizna wodnista Pomidora.** [Watery rot of the Tomato.]—*Acta Soc. Bot. Poloniae*, vii, 4, pp. 599–614, 1930. [French summary. Received May, 1932.]

This is a brief account of a watery rot which in 1928 and 1929 was frequently found destroying tomatoes in the markets of Warsaw. It is distinct from similar rots reported from other countries [the characters of which are briefly described], in that the lesions apparently start at any point of the surface of the fruits, presumably through microscopical ruptures in the cuticle, since inoculation tests showed that the causal organism is unable to penetrate the uninjured skin. The infection gradually spreads until the whole fruit is reduced to a semi-transparent liquid mass with a peculiar acid (but not putrid) smell. Besides numerous yeast-like organisms (which were shown to be non-pathogenic), isolations from the rotting tomatoes yielded a short (1·12 by 0·75 μ), non-motile, non-sporulating, Gram-negative rod, usually occurring in pairs but sometimes isolated and occasionally disposed in short chains. It grew best on tomato juice agar and on carrot, on which it formed rounded, mucous, yellowish-white colonies with a glistening surface. Cultural studies [details of which are given] showed that the organism develops better on solid than in liquid media; it does not liquefy gelatine or coagulate milk, and cannot utilize starch; of nitrogenous substances it can only utilize proteins and peptone, the latter only in the presence of sugar. Its temperature range for growth is from 5° to 37° C., with an optimum between 22° and 26°. It is considered to be new to science and the name *Bacterium lycopersici vitiati* K. Bassalik et H. Strzałkowska is suggested for it. A brief Latin diagnosis is appended. Typical

watery rot was produced in healthy tomatoes inoculated with pure cultures of the bacterium, which was reisolated from the infected fruits.

BREMER (H.). **Zur Frage der Beizung von Tomatensaatgut.** [On the question of Tomato seed disinfection.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xii, 1, p. 2, 1932.

Frl. Niethammer has shown [*R.A.M.*, x, p. 256] that the *dosis tolerata* of uspulun [-universal] for tomato seed (one hour's immersion) is 0·01 per cent. The following values were obtained by Josefowicz (*Ann. Appl. Biol.*, xvii, p. 504, 1930); formaldehyde (10, 15, and 5 minutes' immersion) 2, 1, and 1 per cent., respectively; peroxide of hydrogen (30 minutes) 20 per cent.; corrosive sublimate (10 minutes) 0·05 per cent.; copper sulphate (15, 20, 50, 100, and 200 minutes) 10, 5, 2, 1, and 0·5 per cent., respectively; hot water (15 hours and 1 hour) 46° and 50·5° C., respectively; dry heat (3 days) 50° to 79·5°. Germination was retarded by copper sulphate and peroxide of hydrogen. In view of the extension of two seed-borne tomato diseases in Germany (*Didymella lycopersici* and *Aplanobacter michiganense*) [ibid., x, p. 764], the seed disinfection problem is becoming acute.

VANINE (S. I.). Болезни сеянцев и семян лесных пород. [Seed and seedling diseases of forest trees.]—152 pp., 86 figs., Гос. Издат. С.-хоз. и Колхозно-Кооп. Литературы. [State Publishing Office of Agric. and Collective Farming Co-operative Literature], Leningrad, 1931. [Received May, 1932.]

This rather elementary manual, meant for the Russian student of forest pathology, gives brief accounts of the principal physiological and parasitic diseases that attack coniferous and deciduous nursery seedlings in European and Asiatic Russia, and also of those that are caused by adverse environmental conditions. The great majority of the parasitic diseases [an index of which, arranged by the scientific names, is appended] are well known. Keys are given for the identification of species of *Penicillium* and *Aspergillus* in pure culture. Considerable space is given to control measures and to the description of spraying and dusting apparatus. A few of the illustrations are original, and the bibliography appended covers about 250 titles.

GROSSMANN (HELEN). **Das Ulmensterben.** [The die-back of Elms.] —*Schweiz. Zeitschr. für Forstwesen*, lxxxiii, 2, pp. 49–59, 2 pl., 1932.

An account (based on Dutch and German researches) is given of the symptoms of die-back of elms (*Graphium ulmi*), which is now reported to occur in Switzerland in addition to other European countries and the United States; its connexion with the bark beetles, *Scolytus scolytus* and *S. multistriatus*; and the direct, indirect, and biological measures for its control [*R.A.M.*, xi, p. 409].

BUISMAN (CHRISTINE J.). **Verslag van de phytopathologische onderzoekingen over de Iepenziekte, verricht in het Laboratorium 'Willie Commelin Scholten', gedurende 1931.** [Report

of the phytopathological investigations on the Elm disease conducted in the 'Willie Commelin Scholten' Laboratory during 1931.]—*Tijdschr. over Plantenziekten*, xxxviii, 2, pp. 17–36, 1932.

During 1931 the writer, with the assistance of Miss J. C. Went, made further tests of the reaction of different species and varieties of elms to infection by *Graphium ulmi* [*R.A.M.*, x, p. 695].

A high degree of susceptibility was again shown by *Ulmus americana*, *U. fulva*, *U. serotina*, *U. elliptica*, *U. japonica* (which had given some promise of resistance in the previous trials), *U. foliacea*, *U. glabra*, *U. hollandica*, and *U. procera*. However, a number of seedlings of *U. foliacea* of French and Spanish origin have failed to take the infection for three consecutive years. *U. glabra* var. *fastigiata* and *U. hollandica* var. *vegeta* were resistant. Of the Asiatic species *U. laciniata* and *U. turkestanica* were susceptible, while *U. pumila*, *U. pumila* [var.] *pinnatoramosa*, *U. parvifolia*, and *U. wilsoniana* proved highly resistant. Indications of resistance were also given by *U. davidiana* and the so-called 'Karagatch' elm (possibly identical with *U. pumila* var. *arborea*). *Zelkova serrata* appears to be highly susceptible to infection by *G. ulmi*.

Experiments on water transport in elm tissues, using the fluometer method [ibid., iii, p. 234], showed that diseased branches are scarcely able to allow the passage of any water, the vessels being mechanically obstructed, not by the fungus but by tyloses and gum.

G. ulmi was isolated from every sample of frass from the bore holes in diseased elms in which *Scolytus scolytus* had been feeding.

Inoculation experiments with the close relative of *G. ulmi*, *G. penicillioides* [ibid., x, p. 71], on *U. americana* gave negative results.

In order to ascertain whether the wood of resistant varieties contains a substance that impedes the growth of *G. ulmi*, four strains of the fungus were placed on sterilized living fragments of branches of *U. americana*, *U. pumila*, *U. parvifolia*, and others. Good growth occurred in every case except on *U. americana*, indicating the general absence in resistant varieties of any substance adverse to the development of *G. ulmi*.

The spores of the fungus were found to tolerate about two months' desiccation at room temperature without loss of viability, so that they could be readily conveyed by wind from diseased to healthy trees.

It was found impossible to modify the course of the disease by exposing the young trees to varying temperatures and humidities in warm and cold frames, or by removing the leaves.

[This paper is also published as *Iepenziekte-Comité Meded.* 10, 20 pp., 1932.]

Westerdijk (Johanna), Buisman (Christine), & Doorenbos (S. G. A.). **Wat kunnen Nederlandsche boomkweekers doen in verband met de Iepenziekte?** [What can Dutch arboriculturists do in connexion with the Elm disease?]—*Tijdschr. over Plantenziekten*, xxxviii, 2, pp. 37–40, 1932.

Recommendations are made for the replacement of the elm

varieties commonly grown in Holland, which are susceptible to the 'elm disease' [*Graphium ulmi*], by resistant ones, e.g., some types of *Ulmus foliacea*, *U. glabra* var. *fastigiata*, *U. hollandica* var. *vegeta*, *U. pumila*, *U. wilsoniana*, and *U. parvifolia* [see preceding abstract]. Any of the above-mentioned are suitable for park and street cultivation, but for planting along country roads and dykes it is advisable to obtain individuals of *U. foliacea* combining resistance to the elm disease with vigorous growth and large leaves.

PETRI (L.). **Il metodo d'isolamento della 'Phytophthora cambivora'.** [The method of isolating *Phytophthora cambivora*.] —*Boll. R. Staz. Pat. Veg.*, N.S., xi, 3, pp. 214–221, 3 figs., 1931.

The isolation of *Phytophthora cambivora* [*R.A.M.*, x, p. 122] from chestnuts affected with ink disease is best carried out in spring, as or just before the buds break, from trees not over 30 years old, and showing signs of wilting on one side. When the necrosed areas (which taper upwards to a point) have been located by removing the bark at the base of the trunk on the side bearing the withered branches, small, thin, rectangular pieces of bark and sapwood cut with the long side parallel to the fibrovascular bundles are taken from the apex or sides of an affected area, each piece consisting of a diseased and healthy portion of cambium. The demarcation between the two portions is often quite distinct, the diseased part being somewhat sunken; from such pieces *P. cambivora* cannot be isolated. If, however, the darkened tissue is bordered on the side near the healthy portion by a narrow livid zone shading off into the yellowish-white of the healthy tissue, then the fungus may be isolated from this intermediate zone. In examining the pieces the bark should be removed in the laboratory, as the healthy tissues when exposed to the air oxidize rapidly and become therefore difficult to distinguish from the diseased ones; the isolations should be made on the day the pieces are cut, if possible on the spot. After being cut, the pieces are quickly and aseptically removed to carrot agar decoction treated with malic acid and prepared at a temperature not over 100° C.; at least six isolations are made from each piece, and the cultures are kept at 15° to 18°.

In conclusion, the author points out that an additional symptom to the withering of the branches and the characteristic black rot of the roots is the presence of dark, necrotic areas spreading from the collar along the cambium usually to about 10–20 cm. above soil level, but sometimes rising to a metre above the collar. If there is no discoloration of the cambium above ground, the bark should be cut away towards the collar.

CHRISTOFF (A.). Склеротинията по Черницата. [*Sclerotinia* parasitic on the Mulberry.]—*Renseignements Agricoles*, Sofia, xiii, 1–2, pp. 127–139, 3 figs., 1932. [English summary.]

The author states that in 1928 (a year marked by abnormally wet conditions during the spring and summer in Bulgaria) mulberry [*Morus alba*] plantations in low-lying districts along the

river Maritza were severely attacked by a disease which killed a large number of young shoots arising from two-year-old twigs, and reduced the leaf production by 10 to 50 per cent. The causal organism, which was readily isolated from the lesions and the pathogenicity of which was proved by inoculation experiments, was identified from the morphological characters of its ascogenous stage (produced under controlled conditions) as *Sclerotinia sclerotiorum*. Field observations indicated that it gains entry into the host tissues through old leaf scars and the scales of still dormant buds, from which, under favourable conditions of temperature and humidity, it spreads into the sub-cortical tissues of the twigs, rapidly destroying them and forming numerous isolated or aggregated sclerotia. The disease is believed to be of comparatively old standing in the regions surveyed, but it only assumes an epidemic character in years when periods of warm and dry weather frequently alternate with cold and rainy spells. Some local, but as yet unauthenticated, observations would indicate the existence in the mulberry of varietal differences in susceptibility to the disease, which should be easily amenable to control by the excision of all infected twigs and adequate pruning of the trees in order to ensure the free circulation of air and the access of direct sunlight to all parts of the crown.

KANGAS (E.). **Über die Schädigungen der Kiefernpflanzenbestände in Siikakangas.** [On the injuries of the Pine plant stands in Siikakangas.]—*Silva Fennica*, 17, 107 pp., 12 figs., 5 graphs, 1 map, 1931. [Finnish, with German summary.]

Only three fungi were found causing damage to the pine seedling stands of Siikakangas (central Finland) during recent observations, viz., *Cronartium* (*Peridermium*) *pini*, *Hypodermella sulcigena*, and *Lophodermium pinastri*, the last-named being the most important [*R.A.M.*, viii, p. 687 ; xi, p. 136]. On older plants the fungus occurs in its conidial stage (*Leptostroma pinastri* Desm.) on small branches and twigs. In the younger stands (five years old and upwards) this organism is a most formidable parasite in its *Lophodermium* stage, especially among seedlings 30 to 60 cm. in height grown in densely sown furrows. *Phacidium infestans* [ibid., xi, p. 214] is believed to have been partially responsible for the destruction of large areas of pine seedling stands in the years following the exceptionally hot summer of 1921.

New York blister rust control work breaks record.—*Journ. of Forestry*, xxix, 8, p. 1216, 1931.

According to reports received by H. L. McIntyre, supervisor of forest pest control in the New York Conservation Department, the number of acres of white pine [*Pinus strobus*] forest and plantations covered by the year's campaign for the eradication of *Ribes* against blister rust [*Cronartium ribicola* : *R.A.M.*, xi, p. 142] is 132,000, compared with 107,283 and 127,000 in 1930 and 1929, respectively. Of the new State reforestation areas, 17,135 acres were protected by the year's work, involving the destruction of 420,975 *Ribes* bushes, in addition to which a protective border was established 900 ft. wide in open country and 400 ft. wide in

woodlands adjoining the planted areas. The cost averaged 47 cents per acre for the area protected.

PEARSON (R. S.). **Report of the Director of Forest Products Research for the year 1930.**—*Rept. Forest Products Res. Board for the year 1930*, pp. 5–52, 10 pl., 1 fig., 1 graph, 1932.

In this report it is stated that the moisture content of 25 per cent. specified by the Forest Products Research Laboratory at Princes Risborough in England for timber destined for general carpenters' work is not low enough to render it immune from fungal attack, the minimum content for the development of which is about 20 per cent., but presumes that it will season further soon after being placed in the building. If the timber is to be treated with preservatives it is still necessary to season it to about 20 per cent. moisture content before treatment to obtain satisfactory impregnation.

In further laboratory tests of antiseptics on wood blocks [*R.A.M.*, x, p. 142] *Fomes annosus* proved to be unsuitable, as even when making apparently good growth it did not cause a significant loss in weight. It was decided to employ *Coniophora cerebella* and *Lentinus lepideus* for tests on Scots pine wood blocks and *Polystictus versicolor* on beech blocks.

As an outcome of the conference held at Berlin-Dahlem in June, 1930 [ibid., x, p. 356], the laboratory is participating in a co-operative experiment to arrive at certain standard methods of determining the toxicity of wood preservatives. As a first step an effort is being made to choose one single vigorous strain of *Coniophora cerebella*, to be used in all standard toxicity experiments.

Additional sites for field testing of preservatives [ibid., x, p. 142] have been chosen in North Wales, at an altitude of 900 feet, where the soil is mainly peat, and in Norfolk at an altitude of 100 feet, where the soil is almost pure sand.

In tests of the adaptability of different species of wood to pressure treatment with antiseptics, specimens of standard size (2 in. × 2 in. × 3 ft. 6 in.) were creosoted by a standard process and the figures for absorption used to obtain a measure of the adaptability of the species to treatment. Attempts are being made to eliminate the effect of end-penetration and to measure the rate of penetration of a preservative in a lateral direction radially and tangentially, under a standardized pressure.

The British Wood Preserving Association, formed in 1929 on the lines of the American Wood Preservers' Association, has sought the co-operation of the Forest Products Research Laboratory in the compilation of authentic records of the durability of treated and untreated wood in actual use.

A small experimental house in which the development of a dry rot attack (*Merulius lacrymans*) is to be studied, and control and preventive methods tested, was nearly completed at Princes Risborough during the year.

Investigations showed that the looser and more fibrous types of proprietary wall boards made from vegetable residues are more

susceptible to *M. lacrymans* than the closer, harder, more laminated types.

The collection of type cultures of wood-destroying fungi [ibid., x, p. 142] now includes over 130 species.

The study of *Paxillus panuoides* [ibid., x, p. 143] was completed; the fungus, capable of causing an active brown rot of coniferous timber, frequently occurs in coal mines and occasionally appears in very damp houses. It demands a high moisture content in the wood, but requires a plentiful supply of oxygen; these conditions it finds in sawdust heaps, in which it is commonly present. In diffused light it readily forms fruit bodies in culture on malt agar acidified with malic acid; the amount of light required must be extremely slight, as perfectly developed fruit bodies have been noted in coal mines.

POPHAM (F. J.). **Preservation of Indian timbers—the open tank process.**—*Forest Bull.* 75 (Econ. Ser.), Forest Res. Inst., Dehra Dun, 12 pp., 6 diags., 1931.

The essential features of the open tank process of timber preservation [*R.A.M.*, viii, pp. 212, 621; x, p. 700] are described. For all timber required for external work the preservative recommended consists of 1 part by volume of creosote oil and 1 part by volume of fuel or furnace oil; for special cases in which treated material is required for internal work, sodium fluoride is advised at the rate of 100 lb. in 500 galls. water. Broadly speaking, the cost of the treatment ranges from about 7 annas [approx. 8*d.*] to 1 rupee [1*s.* 6*d.*] per cu. ft., according to the size of the plant, distance from a railway, and other factors. The increased duration of life of the treated timber is roughly about five years. Technical details and sketches are given of various parts of the preservative plant, with a note on the butt treatment of poles.

Among the Indian woods readily treatable by the above process are *Terminalia belerica*, *T. manii*, *T. myriocarpa*, *T. pyrifolia*, *Michelia excelsa*, *Dillenia indica*, and mango (*Mangifera indica*), while some difficulty is experienced in the impregnation of various other species of *Terminalia*, *Dipterocarpus*, *Albizzia lebbek*, *A. lucida*, *A. procera*, *Shorea assamica*, and *Quercus lineata*.

HAASIS (F. W.). **A study of laboratory methods for investigating the relation between moisture content of wood and fungal growth.**—*Phytopath.*, xxii, 1, pp. 71–84, 1932.

In a study on the relation between the moisture content of wood and fungal growth, *Fomes roseus* [*R.A.M.*, x, p. 570] was grown on sapwood of *Pinus ponderosa* at about 27° C. for approximately six months. By adding water to test blocks in a Stender dish [ibid., xi, p. 216], autoclaving them the next day at atmospheric pressure, and allowing them to stand another day, uniform moisture distribution was obtained. It was not found possible, however, to maintain the moisture content at a uniform figure during the period of the investigations, and the results of the tests [which are shown in tabular form] did not give the desired information.

PAPE (H.). **Fäulnis an lagerndem Gemüse und ihre Verhütung.** [Decay of stored vegetables and its prevention.]—*Mitt. Gesellsch. für Vorratsschutz*, viii, 1, pp. 10–11; 2, pp. 21–24, 1 fig., 1932.

Popular notes are given on the decay of stored vegetables, e.g., beets, carrots, parsley roots, celery, and salsify [*Tragopogon porrifolius*], in Germany by *Botrytis cinerea*, *Sclerotinia sclerotiorum*, *Mucor* spp., green mould (*Penicillium* spp.), and other fungi and bacteria, together with directions for its prevention by the proper care of the produce and the provision of suitable storage conditions.

NIELSEN (O.). **Undersøgelser over 'black leg' paa Kaal og tørforraadnelse paa Kaalroer.** [Investigations on blackleg of Cabbage and dry rot of Swedes.]—*Tidsskr. for Planteavl*, xxxviii, 1, pp. 131–154, 8 figs., 1932. [English summary.]

Blackleg of crucifers (*Phoma lingam*) [*R.A.M.*, xi, p. 345] was observed on the island of Amager, Denmark, in 1927, the fungus being isolated nine times from cauliflower and cabbage seed as well as from the growing plants. Cabbage seed was found to contain from 0 to 30 infected seeds per 1,000, over 60 of the 80 samples examined being free from the fungus. Pycnidia of *P. lingam* have often been observed on seed being tested for germination in the Jacobsen germinator. In a consignment of American cabbage seed known to have been infected by blackleg *P. lingam* failed to develop in agar cultures made seven years after harvesting, so that the fungus had evidently died during the interval, though 15 per cent. of the seed germinated.

The seed becomes infected in the siliquae, the dormant mycelium occurring between the seed coat and the embryo in the rudimentary seed albumen. Many seedlings die with the symptoms of 'damping-off', the spores of the fungus spreading from them to neighbouring plants. Later the root becomes black and rots away and the plant collapses. *P. lingam* may cause severe damage among stored winter cabbages.

Dry rot of swedes, also caused by *P. lingam* [ibid., vii, p. 71; viii, p. 752], is disseminated by the seed in the same way as blackleg. The fungus has frequently been found on swede seeds and isolated from them four times. Swede seedlings, like those of cabbage, are liable to damping-off, and from September onwards secondary infection from these seedlings appears in the field. Swede seed has been found to contain from 0 to 31 infected seeds per 1,000; of the 70 swede and 10 turnip seeds samples examined, nearly 25 per cent. showed the presence of *P. lingam*.

The only practicable control measures against *P. lingam* are stated to be seed disinfection (one hour's immersion in 0·5 per cent. uspulun after 30 minutes' pre-soaking) and a rational system of crop rotation to prevent soil infection.

BLANK (L. M.). **The pathogenicity of Fusarium conglutinans Wr. at low soil temperatures.**—*Phytopath.*, xxii, 2, pp. 191–195, 1932.

The minimum soil temperature at which cabbage yellows

(*Fusarium conglutinans*) becomes apparent is usually held to be 17° C. [*R.A.M.*, vi, p. 265], but the writer's experiments under controlled conditions in Wisconsin clearly showed that the disease may develop in cabbage, cauliflower, Brussels sprouts, and other sub-species or varieties of *Brassica oleracea* at 12° to 15°, while at 16·5° the fungus is capable of killing a large proportion of the seedlings. As already shown by Walker and Wellman [ibid., viii, p. 148], the Moss Curled Dwarf is the most susceptible kale [*B. oleracea* var. *acephala*] variety and Siberian the least, the thousand-headed being intermediate.

Honig [F.]. **Beiträge zur Kohlkropffrage.** [Contributions to the problem of finger-and-toe of Cabbage.]—*Nachricht. über Schädlingsbekämpf.*, vii, 1, pp. 22–27, 4 figs., 1932.

Good control of finger-and-toe disease (*Plasmodiophora brassicae*) on mustard [*Brassica alba*] was obtained at Nuremberg, Germany, by the application to the soil of uspulun at the rate of 100, 200, or 300 gm. per sq. m. [*R.A.M.*, ix, p. 752], which reduced the incidence of infection (average of all plots) from 49·6 to 7·2 per cent. The plants in the treated plots were, moreover, only affected at the root tips in contrast to those in the untreated, which were attacked at or near the collar.

Other experiments showed that the White Munich Beer radish may contract up to 20 per cent. finger-and-toe infection [ibid., xi, p. 16]. *Matthiola annua* maintained its immunity from the disease [ibid., ii, p. 223] while some other crucifers were attacked to the extent of 80 per cent. In a test with five varieties of kohlrabi [*B. oleracea* var. *caulo-rapa*], the incidence of infection was as follows: Gelbe Schmalz 7·3 per cent., Weisse Schmalz 27·7, Weisse Wester 0, Gelbe Wester 32·6, and Apfel gelb 6·2. In Germany, therefore, unlike Switzerland [ibid., ix, p. 218], the Schmalz varieties are liable to infection by *P. brassicae*, this being possibly an instance of biologic specialization.

Laubert (R.). **Cystopus-Wurzelkropf an Radieschen.** [*Cystopus* root swelling on Radishes.]—*Die Kranke Pflanze*, ix, 1, pp. 3–4, 1932.

A radish plant of the Eiszapfen [Icicle] variety sent from Aschersleben [Saxony] to the Biologische Reichsanstalt for examination in October, 1931, showed a puffy, fleshy swelling on the upper part of the tap-root, the tissues of which were found to contain the oospores of *Cystopus candidus* [*R.A.M.*, x, p. 556]. This is believed to be only the second record of the occurrence of the fungus in question on a radish root, the first having been made by Beck von Mannagetta (*Lotos*, xlvii, p. 281, 1899), who detected it in association with *Peronospora brassicae* [ibid., xi, p. 220] on a red variety in Czecho-Slovakia.

Tompkins (C. M.) & Pack (D. A.). **Effect of temperature on rate of decay of Sugar Beets by strains of Phoma betae.**—*Journ. Agric. Res.*, xliv, 1, pp. 29–37, 1 fig., 1 graph, 1932.

The purpose of the investigation reported in some detail in this paper was to study the effect of temperature and length of storage

on the rate of development of the rot induced in sugar beets by *Phoma betae*, which is stated to be undoubtedly the most important wound parasite of the stored crop in the western United States [*R.A.M.*, viii, p. 284; x, p. 73]. The experiments included four strains of the fungus which exhibited significant differences in the size of their spores [which are shown in a table] and in their cultural characters; they also differed somewhat widely in the rate at which they destroy beet tissue under controlled conditions, and it is therefore believed that they are distinct strains: there was also evidence of the existence in nature of many more different strains of the organism. The results of the experiments showed that temperature is one of the most important factors involved in the rotting process, the rapidity of which was significantly increased with each increase of 5° C. in temperature from 1° to 15°. The practical inference from these studies is that in localities where high temperatures prevail during the harvest period, the piling up of the beetroots should be delayed until the advent of cooler weather.

MACPHERSON (N. J.). **The cultivation of Lettuce under glass with special reference to varieties resistant to downy mildew.**—*Journ. Min. Agric.*, xxxviii, 10, pp. 998–1003, 6 figs., 1932.

Owing to the very marked susceptibility to downy mildew (*Bremia lactucae*) [*R.A.M.*, iii, p. 248; ix, p. 362], which causes losses amounting sometimes to over 50 per cent. of the crop, of the French Frame Forcing variety of lettuce, which until recently was grown almost exclusively for forcing under glass in the Marton district of Lancashire, varietal resistance tests were carried out under market-garden conditions at two centres in this area. In both localities Loos Tennisball (Gotte à graine blanche de Loos) and Rosy Spring (Rosée printanière) remained unaffected by the disease, while May Queen (Dutch seed), planted at one centre, showed less than 1 per cent. infection, this result being confirmed by a supplementary trial at the horticultural station, Hutton.

Growers of lettuces under glass could do useful work by selecting for stock from which to save seed any plants showing high resistance to *B. lactucae*.

TOWNSEND (G. R.) & NEWHALL (A. G.). **The control of bottom rot of Lettuce.**—*Cornell Agric. Exper. Stat. Bull.* 535, 11 pp., 6 figs., 1932.

Bottom rot of lettuce (*Rhizoctonia* [*Corticium*] *solani*) [the symptoms of which are briefly described: *R.A.M.*, xi, p. 417] causes an annual loss of 30 per cent. of the crop on muck soils in the State of New York. The disease, which is most severe in warm, humid weather, may be very satisfactorily controlled by one application of Du Bay 738 dust (2 per cent. ethyl mercury phosphate) made at the rate of 20 to 25 lb. per acre, suitable traction machines for applying which are described. This treatment, the cost of which did not exceed $15 per acre, gave an average increase in yield of 180 crates of lettuces per acre.

Flachs (K.). **Durch Sclerotinia minor Jagg. hervorgerufene Salatfäule und Versuche zu ihrer Bekämpfung.** [Lettuce rot caused by *Sclerotinia minor* Jagg. and experiments in its control.]—*Gartenbauwissensch.*, v, p. 541, 1931. [Abs. in *Fortschr. der Landw.*, vii, 8, pp. 233–234, 1932.]

Lettuce in Bavaria is reported to be extensively infected by *Sclerotinia minor* [*R.A.M.*, x, p. 286]. The outer leaves of infected plants first turn brown and rot, the inner leaves then become involved, the root collar decays from the exterior inwards, and finally the whole plant collapses. The minimum, optimum, and maximum temperatures for the growth of the fungus are 5°, 20° to 23°, and 35° C., but viability persists even below −15°. Humidity favours the development of infection, which can take place through the uninjured epidermis. The sclerotia remain viable for more than 20 months. The organism is not transmitted by the seed and is therefore not controllable by seed disinfection, but the application to the soil of 1·5 per cent. formalin or acetic acid at the rate of 10 to 12 l. per sq. m. has given good results, especially in conjunction with the use of peat mould. No remedial effect was produced by various fertilizers, but steam sterilization of the soil is efficacious. Constant attention must be paid to the removal and destruction of wilted plants.

Heim (R.). **Le Phaeolus manihotis sp. nov., parasite du Manioc à Madagascar, et considérations sur le genre Phaeolus Pat.** [*Phaeolus manihotis* sp. nov. parasitic on Cassava in Madagascar, and observations on the genus *Phaeolus* Pat.]—*Ann. de Cryptog. Exot.*, iv, 3–4, pp. 175–189, 3 pl. (1 col.), 1 fig., 1931.

This is a morphological and biochemical account of a species of *Phaeolus* considered to be new to science and named *P. manihotis*, which was found causing a severe root rot of several cultivated crops, including cassava, pigeon pea (*Cajanus indicus*), bun ochra (*Urena lobata*), and probably also cotton, in several localities of Madagascar. The roots of the hosts are enclosed in a thick, closely adpressed mycelial weft of the fungus, which kills them by asphyxiation; most of the plants attacked soon perish, after which the sporophores are formed above soil level. The latter are usually connate, rusty yellow above, soft, and briefly tomentous. They may be up to 40 cm. in diameter; their general shape is vaguely conical and maximum thickness about 7 cm.; the stipe, which is sometimes wanting, is for the most part 6 or 7 cm. high and 3 or 4 cm. thick. The hymenial pores form an ochraceous or tawny layer and are irregularly rectangular, usually 5 or 6 per 2 mm. surface but in places up to 1·5 mm. in diameter. The spores are oboval-subcylindrical, hyaline, and measure 5·5 to 7 by 3·2 to 4·3 μ; they are borne on short, claviform basidia, 11 to 14 by 6 to 8 μ, each provided with 4 sterigmata.

Passecker (F.). **Schädliche Pilze in Champignonkulturen.** [Injurious fungi in Mushroom cultures.]—*Obst- und Gemüsebau*, lxxviii, 2, pp. 26–27, 3 figs., 1932.

Popular notes are given on the diseases of cultivated mushrooms

in Austria and elsewhere caused by *Hypomyces perniciosus* [*Mycogone perniciosa*] ('môle'), which is stated to be so widespread in France that scarcely a bed is free from it [*R.A.M.*, vi, p. 530: x, p. 8]: *Myceliophthora lutea* [ibid., vi, p. 523] and species of *Aspergillus*, *Penicillium*, and *Trichoderma*, responsible for green, yellowish-green, or bluish-green patches ('verdigris') in beds where the manure is insufficiently fermented; *Monilia fimicola* ('plaster-of-Paris disease') [or *Verticilliopsis infestans*: ibid., v, p. 592; viii, p. 288]; *Clitocybe dealbata* [*C. candicans*] and *Pleurotus mutilus* ('cat's ear') [ibid., v, p. 592], both of which are generally introduced with the spawn or soil. Directions are given for the control of the diseases, e.g., by disinfection of the beds with 2 to 2·5 per cent. lysol or with a solution of potassium permanganate.

Nielsen (O.). **Champignon-sygdomme.** [Mushroom diseases.]—Reprinted from *Gartnertidende, 1932*, 2 pp., 1932.

Notes are given on the occurrence and control of a number of diseases affecting cultivated mushrooms in Denmark and other countries [see preceding abstract].

'Bubbles' or 'môle' (*Mycogone perniciosa*), first described from Paris in 1888, is stated to be responsible for the heaviest losses in the mushroom beds of France, England, and the United States (10 to 25 per cent. of the yield in the Paris district); of recent years the parasite has been detected several times in Denmark. *Myceliophthora lutea* completely prevents the development of the cap and destroys the entire bed. Other diseases are caused by *Monilia fimicola*, *Verticilliopsis infestans*, *Clitocybe candicans*, *Pleurotus mutilus*, *Pseudobalsamia* [*microspora*: *R.A.M.*, x, p. 290] (causing the loss of the later part of the crop), and *Pseudomonas tolaasii* [ibid., iv, p. 469]. Some of these do not attack the mushrooms themselves, but interfere with their development in the beds.

Lambert's studies on the temperature relations of *Mycogone perniciosa* are briefly summarized [ibid., ix, p. 429]. The fungus may be killed by the application to the soil of 2 per cent. lysol, formalin, or phenol, or 0·2 per cent. corrosive sublimate, but the latest recommendation from the United States is to keep both the manure and the covering soil at 50° C. in a house which should be fumigated with sulphur at the rate of 4 gm. per cu. m. Should the fungus be found to have entered the house despite all precautions, the soil should be treated with one of the above-mentioned disinfectants and the temperature maintained at 10° to 13°. When the moisture content of the manure is 50 to 60 per cent. the mushrooms produce rhizomorphs in profusion, but above 72 per cent. growth ceases. In order to ensure the best development of the mushrooms the soil reaction should be adjusted to about P_H 6.

Small (T.). **Report of the Mycologist.**—*Rapports aux États de l'Île de Jersey pour l'année 1931*, pp. 28–40, 3 pl., 1932.

Experiments conducted in Jersey [Channel Islands] in 1931 indicated that potato blight (*Phytophthora infestans*) was not

reduced when the seed was treated with copper and sulphur dusts, immersed for two hours when the sprouts were present in December in 1 pint of 40 per cent. formaldehyde per 30 galls. water, or immersed for 1½ hours in December in mercuric chloride 1 in 1,200. Spraying the soil with 3 galls. of 40 per cent. formaldehyde in 100 galls. water per perch also had no effect on the disease but increased the yield. When the plants were sprayed during the growing season with copper sulphate and caustic soda (6–2–60) they remained healthy, tubers from the sprayed plants being free from blight when dug up and remaining healthy when stored; unsprayed plants were severely blighted, the disease being prevalent in the tubers at digging time and later. Cutting and removing the tops and spraying the soil with 2 per cent. formaldehyde just before harvesting appeared to be unnecessary if the plants were healthy when dug, and where the plants were already diseased did not prevent tuber infection.

The fungus was also prevalent on outdoor tomatoes, while a few glasshouse tomato crops were also attacked. Attempts artificially to infect tomatoes with inoculum from diseased potato plants were unsuccessful. Stem canker (*Didymella lycopersici*) caused much loss of fruit on outdoor tomatoes.

In another section of these reports (pp. 41–48) it is stated that in a test for the control of scab [*Venturia pirina*] in which Doyenné du Comice pear trees were given, respectively, three applications of sulfinette, four of kolodust, and three of Bordeaux mixture, the first-named treatment resulted in 57·4 per cent. of pears completely free from scab and 42·6 per cent. slightly scabbed, the second in 65·1 per cent. completely scab free, 31·9 per cent. slightly scabbed, and 3 per cent. unmarketable, and the third in 76·5 per cent. clean, and 23·5 per cent. slightly scabbed; the unsprayed control plot gave 13·1 per cent. clean pears, 40·8 per cent. slightly scabbed, and 46·1 per cent. unmarketable. The pears from the dusted plot were very badly russeted. A second experiment with pear trees of the same variety indicated that an extra pre-blossom application of Bordeaux mixture made in the 'mouse-ear' stage gave no greater control than resulted when only one pre-blossom application was made. This result was confirmed in a further test on Pitmaston Duchess pears; in this case, the pears from trees sprayed with Bordeaux mixture had a better finish than those from trees treated with lime-sulphur, the latter showing appreciable russeting.

Müller (K.). **XI. Jahresbericht des Badischen Weinbauinstituts in Freiburg i. Br. Staatliche Versuchs- und Forschungsanstalt für Weinbau und Weinbehandlung mit angegliederter Hauptstelle für Pflanzenschutz in Baden für das Jahr 1931.** [Eleventh report for the year 1931 of the Baden Viticultural Institute at Freiburg i. Br. State Experimental and Research Institute for Viticulture and Œnology with the affiliated Headquarters for Plant Protection in Baden.] —47 pp., 1932.

The following references of phytopathological interest, amongst others, occur in this report. *Peronospora* [*Plasmopara viticola*]

was first observed in the vineyards of the Institute on 3rd June, severe outbreaks occurring on 12th July, followed by general spread of the disease consequent on the persistent wet weather. Petiole [or grey] rot (*Botrytis*) [*cinerea*: *R.A.M.*, vii, pp. 9, 221] was very prevalent, especially on the Müller-Thürgau selection of Riesling × Silvaner. The must weight of the vines in an infected plot amounted to only 62° Oechsle and the acid content 13 per mille.

Notes are given on the prevalence of the more important diseases of various other crops in the region.

MONTEMARTINI (L.). **L'osservatorio fitopatologico di Palermo negli anni 1929-1931.** [The phytopathological observatory of Palermo in the years 1929-1931.]—*Riv. Pat. Veg.*, xxi, 9–10, pp. 257–279, 1931.

This report of plant diseases observed in the vicinity of Palermo during the period under review, contains numerous items of phytopathological interest, some of the more important of which have already been noticed from other sources [cf. ibid., ix, p. 648; x, p. 386; xi, p. 116].

NEUWEILER (E.). **Bericht über die Tätigkeit der Eidgenössischen landwirtschaftlichen Versuchsanstalt Oerlikon für das Jahr 1930. IV. Pflanzenschutz. (1. Januar 1929 bis 31. Dezember 1930.)** [Report on the work of the Federal Agricultural Experiment Station Oerlikon for the year 1930. IV. Plant Protection. (1st January, 1929 to 31st December, 1930.)]—*Landw. Jahrb. der Schweiz*, xlvi, 1, pp. 128–135, 1932.

Wart disease (*Synchytrium endobioticum*) was detected in various localities in Lucerne, St. Gall, Thurgau, and the Vorarlberg frontier region during 1929 and 1930. At Root (Lucerne) potatoes were inadvertently planted on ground that had been infested in 1925 and subsequently sold and broken up for pasturage, with the result that the disease reappeared though four years had elapsed.

Foot rot of cereals (*Ophiobolus herpotrichus*) [*R.A.M.*, vi, p. 429] was very prevalent in 1930, and heart rot of beets [ibid., ix, p. 757] was widespread in both years.

CONNERS (I. L.). **Eleventh Annual Report of the Canadian Plant Disease Survey 1931.**—*Canada Dept. of Agric., Exper. Farms Branch*, 129 pp., 1 map, 1932. [Mimeographed.]

Notes are given on the occurrence of fungous, bacterial, and non-parasitic diseases on cereals, fodder crops, potatoes, and other vegetables, fruit, forest and shade trees, tobacco, and ornamental plants in Canada during 1931 [cf. *R.A.M.*, xi, p. 96].

ORIAN (G.). **Botanical Division.**—*Ann. Rept. Mauritius Dept. of Agric. for the year 1930*, pp. 10–13, 1932.

In this report (cf. *R.A.M.*, x, p. 503) it is stated that leaf scald (*Bacterium albilineans*) and gummosis (*Bact. vascularum*) continue to be the principal diseases of sugar-cane in Mauritius, the

percentages of apparent infection being, respectively, 8 and 8·8 per cent. Streak [ibid., x, p. 504] remained confined to the R.P. variety, and very small percentages of infection were noted during the period under review on four new estates; the yield from diseased rows in an experimental plot laid down in 1928 was 47 per cent. less than that from the healthy rows, as compared with 44 per cent. less in 1929. Fortunately, there appears to be no insect vector of the disease in the island.

The collar rot of tobacco previously described as associated with a *Phytophthora* [loc. cit.] was reported from four districts; in some plantations in one locality spread was very rapid, with resultant severe losses.

A *Fusarium*, considered to be possibly a strain of *F. cubense*, was isolated from the banana wilt reported earlier [loc. cit.]. There was no record of the disease in 1930.

Department of Botany.—*Ann. Rept. Massachusetts Agric. Exper. Stat. for the fiscal year ending Nov. 30, 1931* (*Bull.* 280), pp. 201–208, 1932.

In the section of this report dealing with plant pathology W. L. Doran states that tobacco yields were consistently increased when sulphur was applied to soil infested with *Thielavia basicola* [*R.A.M.*, x, p. 762] whenever the P_H value of the soil was reduced to below 5·9, but not otherwise; sulphur alone reduced the P_H value as much as when aluminium phosphate was added. No consistent relation was established between the severity of the brown root rot of tobacco [ibid., x, p. 763] and the P_H value of soils, soil content of organic and volatile matter, total nitrogen, nitrate nitrogen, or iron and aluminium oxides soluble in water.

No positive evidence was obtained that the causal organism of downy mildew of cucumbers (*Peronoplasmopara* [*Pseudoperonospora*] *cubensis*) ever lives through the winter in Massachusetts. No oospores or other overwintering stages could be found in green leaves or leaves killed by the disease and wintered in the soil outdoors.

Damping-off [plants and parasites unspecified] was prevented without injury to germination and with benefit to growth by soil treatment with acetic acid 1·2 per cent., applied 10 days before seeding at the rate of 2 qts. per sq. ft., the cost per unit area of soil being only three-fourths that of formaldehyde treatment [cf. ibid., x, p. 161]. The condition was also prevented without injury to germination by vinegar 1 part in 2·5 parts water, applied at the same rate 10 days before seeding. Red pine [*Pinus resinosa*] seedlings were protected against damping-off and germination was not injured by acetic acid 0·8 per cent. applied to the soil at seeding at the rate of 0·75 qt. per sq. ft.

E. F. Guba states that seed from strawberry plants affected with 'gold' disease produced both diseased and healthy seedlings, indicating some seed transmission of the disease. Affected seedlings showed marked stunting and necrosis. Experiments demonstrated that all the vegetative progeny of 'gold' plants acquire the disease, as did many apparently healthy plants obtained from a source where the condition was present. Apart from the systemic

nature of the disease, no evidence of its manner of spread was obtained.

'Stunt' or 'die-out' of strawberries, suspected to be due to the virus of the true yellows disease [ibid., vii, p. 650; see also ibid., ix, p. 193] was observed (for the first time in Massachusetts) on the Marshall variety only.

A study of the reaction of numerous tomato varieties to *Cladosporium fulvum* [ibid., x, pp. 479, 630, 631] showed some differences in susceptibility.

The optimum temperature for the growth of the carnation blight organism (*Alternaria dianthi*) [ibid., x, p. 438] in pure culture was approximately 80° F., the minimum and maximum temperatures being approximately 39° and 97°, respectively. Potassium permanganate 1 in 1,000 was a valuable disinfectant for carnation cuttings, a five-minute dip greatly improving rooting and reducing *Alternaria* infection. Further tests confirmed the efficacy of naphthalene fumigation in controlling *A. dianthi* and *Fusarium* stem rot [cf. ibid., iii, p. 493; viii, p. 787] and gave an increased yield of 35·1 per cent. as compared with syringing with water. The best field treatments (in descending order of merit) were Bordeaux mixture 4–4–50 plus 1 lb. calcium arsenate, the same plus one half-pint fish oil, and Bordeaux mixture 4–4–50 with fish oil.

Department of Botany.—*Forty-fourth Ann. Rept. Pennsylvania Agric. Exper. Stat. for the fiscal year ending June 30, 1931* (*Bull.* 266), pp. 16–19, 1 fig., 1931.

When the fruits of William pears and Yellow Transparent apples, and the twigs of a resistant pear seedling were inoculated with the fireblight organism [*Bacillus amylovorus*], the tissues of the apples were rapidly invaded by the zoogloeal masses, but no invasion was observed in the William pears or the seedling twigs. About six years previously one Kieffer seedling did not blight when inoculated, and since then has remained unaffected although inoculated annually. The seedling was propagated, and cross-pollinations with several commercial varieties made [cf. *R.A.M.*, x, p. 84].

Soil applications of calomel [mercurous chloride] injured tobacco seedlings in containers that prevented leaching, but Bordeaux mixture caused no significant injury and increased the stand. In outdoor beds both fungicides were safely used. On unsterilized soil improvement resulted from applications of calomel made at the rate of 1 gm. per sq. yd., this treatment controlling the injurious soil fungi. Effective control of wildfire [*Bacterium tabacum*] by these treatments depended greatly upon their being applied early, before any seedling spotting developed.

In spite of extreme drought, wood-decaying fungi established themselves on 95·7 per cent. of the stumps of 115 felled oaks, virtually all of which became infected during the first year after felling. The fungi present were *Lenzites betulina*, *Panus stipticus*, *Polyporus* [*Polystictus*] *versicolor*, *Hydnum ochraceum*, *Stereum rameale*, *Panus rudis*, and *S. gausapatum* on 78·2, 45, 36·5, 13·9, 10·4, 6·9, and 2·6 per cent. of the stumps, respectively.

Botany and plant pathology section.—*Ann. Rept. Iowa Agric. Exper. Stat. for the year ending June 30, 1931*, pp. 39–51, 2 figs., 1931.

Surveys conducted during the period under review showed that there is an increase in the amount of maize smut (*Ustilago zeae*) present in Iowa during a dry season. It was also ascertained that *Diplodia zeae* can attack the roots and basal portions of maize through the soil [*R.A.M.*, xi, p. 447], some 13 per cent. of the stand near Ames showing this type of infection in 1930. Greenhouse tests showed that when infection extended 2 to 4 inches above soil level, the stalk died prematurely. Symptoms on the crowns also arose from infected seed which produced plants strong enough to escape seedling blight. Of these two types of infection, the latter was the more serious, probably because the fungus was growing with the plant from the day the seed sprouted until the plant died. *D. zeae* requires very favourable conditions before it can grow in the soil, and judging from the slow progress of the disease the root system of maize appears to be highly resistant to infection from the soil.

Treatments with commercial and experimental dust fungicides on maize seed nearly disease-free, infected with *D. zeae*, and infected with *Basisporium gallarum* [*Nigrospora sphaerica*: ibid., xi, p. 448] increased the field stands, on an average, by 5·8, 26, and 19·9 per cent., respectively, while the average increase in yield was 9·5 per cent.

Twenty-eight physiologic forms of crown rust of oats [*Puccinia lolii*: ibid., xi, p. 233] were identified among 331 collections by the specific reaction of 11 differential oat varieties. Physiologic forms 1 and 7 hibernate in southern oat-growing areas, these, with form 3, which is disseminated from *Rhamnus cathartica*, being the most widespread and prevalent forms in Iowa. Many rare forms were collected only from *Rhamnus*. Physiologic form 1, the most common, attacks all commercial varieties of oats, except Victoria (C.I. No. 2401) and Scasso (C.I. No. 2764), both of which were introduced from the Argentine. Resistance to physiologic forms 1, 2, 3, and 7 of *P. lolii* in the seedling and adult stages is generally dominant and in the seedling stage is dependent upon a single pair of factors. From certain hybrids with Victoria (C.I. No. 2401) as one parent, segregates were selected that appeared to be resistant to crown rust, stem rust [*P. graminis*], and loose and covered smuts [*Ustilago avenae* and *U. kolleri*].

Ninety-seven progenies of the beets selected in 1928 from Pioneer and Leaf Spot Resistant as resistant to *Cercospora* [*beticola*] were grown under epidemic conditions, some 1,500 stecklings being selected for seed production in the field. Remnant seed progenies from this material were grown under epidemic conditions during the winter of 1930. Twelve progenies showed some resistance and were selected for a further field trial. During the summer of 1931, initial infection occurred along the edge of the fields, indicating the presence of weed hosts, and heavy infection with a *Cercospora* was in fact noted on *Chenopodium album*, *Melilotus alba*, lucerne, and clover. Field data indicated the possibility that the leaf spots on these hosts were inter-transmissible.

Plant pathology at the Idaho Station.—*Idaho Agric. Exper. Stat. Bull.* 179, pp. 12, 34, 35, 1931. [Abs. in *Exper. Stat. Record*, lxvi, 3, p. 235, 1932.]

Iron and manganese inserted directly into the trunks of trees were not lastingly effective in preventing chlorosis [*R.A.M.*, ix, p. 501], which was particularly severe in Idaho in the spring of 1930, and was accompanied by considerable visible nitrogen starvation. Greenhouse studies with spinach showed that the P_H value of the sap was not controlled by that of the soil. In investigations into the sclerotium disease of wheat [*Sclerotium rhizodes*: ibid., x, p. 191] two organisms were isolated which differed markedly in the size of the sclerotia produced in pure culture and in the temperature optima for their production. Three distinct physiologic forms of stinking smut [*Tilletia foetens*] were found. Progress was made in the development of Great Northern beans [*Phaseolus vulgaris*] resistant to mosaic [cf. ibid., x, pp. 164, 283, 358], certain selections being of excellent quality and high yield. As segregation is still taking place in these lines, no homozygous resistant segregants have yet been secured. Some variation in susceptibility to clover mildew [*Erysiphe polygoni*: ibid., x, p. 388] was seen in selected and crossed lines, and in preliminary tests some indication was obtained that strains of lucerne resistant to bacterial wilt [*Aplanobacter insidiosum*: ibid., x, pp. 439, 464, 525] may also be secured by selection.

Thomas (J. A.). **Production de tumeurs d'apparence sarcomateuse chez l'annélide Nereis diversicolor O.F.M. par l'inoculation de Bacterium tumefaciens Sm.** [The production of tumours of sarcomatous aspect in the annelid *Nereis diversicolor* O.F.M. by inoculation with *Bacterium tumefaciens* Sm.]—*Comptes rendus Acad. Sci.*, cxciii, 21, pp. 1045–1047, 1931.

As previously reported in *Sipunculus nudus* [*R.A.M.*, xi, p. 227], individuals of the annelid *Nereis diversicolor* inoculated in the general cavity with *Bacterium tumefaciens* rapidly succumbed to the resultant sarcomatous tumours. In the nucleus and cytoplasm the parasite is transformed into grains near the limit of visibility, while the blood stream is occupied by active rod-shaped elements.

Marchionatto (J. B.). **La roya amarilla del Trigo en la zona central.** [The yellow rust of Wheat in the central zone.]—*Bol. Min. Agric. Nac.*, Buenos Aires, xxx, 4, pp. 215–218, 1931.

As in Europe, the United States, and other cereal-growing countries, yellow rust of wheat (*Puccinia glumarum*) is the first to appear in the Argentine [*R.A.M.*, xi, p. 359], followed by orange (*P. triticina*) and then by black rust [*P. graminis*]. Among the grass hosts of *P. glumarum* are *Bromus unioloides* and *Hordeum jubatum*, whence infection readily spreads to the cultivated wheats, most of which are susceptible, Record and Barleta being the most and Ardito and Favorito the least so. During 1930 there was a constant succession of abnormally cold periods, to which the violent outbreaks of yellow rust in the south of Santa Fé, the central region and south of Cordoba, and the north-east of Buenos

Aires may be attributed. Some general recommendations for the control of the disease are made.

Briggs (F. N.). **Inheritance of resistance to bunt, Tilletia tritici, in crosses of White Federation with Turkey Wheats.** —*Journ. Agric. Res.*, xliv, 2, pp. 121–126, 1 graph, 1932.

As a result of his continued studies on the inheritance in wheat of resistance to bunt (*Tilletia tritici*) [*T. caries*: *R.A.M.*, x, p. 648], the author states that the behaviour of the F_1, F_2, and F_3 generations of crosses between the susceptible White Federation and two resistant strains of Turkey wheat (C.I. 1558 and C.I. 3055) indicated that each of these strains differs from White Federation in one main factor for resistance. These factors are similar in effect to each other and resemble the second Hussar factor [loc. cit.] in that about one-half of the heterozygous plants were susceptible, a fact which clearly distinguishes them from the factor for resistance in Martin, which is completely dominant. This conclusion was further confirmed by the presence of bunt in the F_2 population of crosses between the two Turkey strains and Martin, and also by the presence of susceptible and segregating F_3 lines of the same crosses. Further work is in progress to determine whether or not the factors for resistance in the Turkey strains are identical with each other and with the second Hussar factor.

Dillon Weston (W. A. R.). **The relative resistance of some Wheat varieties to Tilletia caries (DC.) Tul. (= T. tritici (Bjerk.) Wint.).**—*Ann. of Appl. Biol.*, xix, 1, pp. 35–54, 1932.

This paper is a summarized account of the author's investigation at Cambridge, started in 1923, of the relative resistance of wheat varieties to bunt (*Tilletia caries*) in England, some results of which have been from time to time noticed in this *Review* [*R.A.M.*, ix, p. 27; x, p. 444, *et passim*]. The data obtained [presented in tabular form] indicated that the relative susceptibility of a wheat variety is considerably influenced by environmental conditions, e. g., date and rate of sowing, by the spore load of the seed-grain, and also by the origin of the inoculum used, the strain naturally occurring or grown for several consecutive seasons on a given variety being much more virulent to it than strains derived from other varieties. This last point was well illustrated in wheat hybridization experiments between resistant and susceptible varieties, in which the F_3 progeny of crosses was tested by infecting the seed-grain with bunt from both parents and with 'mixed F_2 bunt', i.e., from a large bunch of bunted ears from all the affected F_2 plants derived from inoculation with the various parental bunts; F_3 plants free from bunt were obtained only in the few cases in which one parental bunt happened to be unobtainable for seed infection. Contamination of the soil with spores of *T. caries* was shown to have a minor significance under English conditions, and may be ignored in varietal tests for resistance.

These results are interpreted to indicate that *T. caries* consists of a number of physiological forms [cf. ibid., xi, p. 360]; repeated passage of the parasite through a given variety is believed to increase its virulence because this process leads to the selection of

a particular form or forms well adapted to the environmental conditions provided by the variety. It is thought that varietal resistance of wheat to *T. caries* is dependent on at least three factors, namely, the strain of the host, the physiological form of the parasite, and environment.

Experiments in 1928-9 and 1929–30 confirmed the susceptibility of rye to *T. caries* from wheat [ibid., x, p. 590], and indicated that it may be used as a differential host for determining the different physiological forms of wheat bunt.

Bodnár (J.) & Terényi (A.). **Biochemie der Brandkrankheiten der Getreidearten. IV. Mitteilung. Wirkungsmechanismus der Quecksilbersalze auf die Weizensteinbrandsporen [Tilletia tritici (Bjerk.) Winter].** [Biochemistry of the smut diseases of cereals. Note IV. The mechanism of the action of mercury salts on the spores of Wheat bunt (*Tilletia tritici* (Bjerk.) Winter).]—*Hoppe-Seyler's Zeitschr. für Physiol. Chemie*, ccvii, 1–2, pp. 78–92, 1932.

The results [which are fully discussed and tabulated] of the writers' investigations at Budapest on the mechanism of the action of mercury salts on wheat bunt (*Tilletia tritici*) [*T. caries*] spores [cf. *R.A.M.*, ix, p. 444] showed that the spores adsorb from 0·01, 0·05, and 0·1 per cent. mercuric chloride, mercuric bromide, and mercuric acetate solutions a considerable amount of mercury (e.g., from 0·1 per cent. solutions 3·65, 2·58, and 10·15 per cent. mercury, respectively: see also *Zeitschr. Physiol. Chem.*, cxcii, p. 274, 1930). The adsorption of mercury is irreversible.

The bunt spores containing adsorbed mercury do not germinate on a calcium nitrate solution, whereas those steeped in mercuric cyanide and containing no adsorbed mercury germinate well. On damp soil the bunt spores treated with mercuric chloride and mercuric bromide solutions do not germinate, while those treated with mercuric acetate germinate well notwithstanding their high content of adsorbed mercury.

In addition to the mercury ions the bunt spores adsorb from the mercuric chloride and mercuric bromide solutions mercuric chloride and mercuric bromide molecules, which with their lipoid-soluble properties penetrate and kill the spores. The spore-destroying action of a dilute (0·005 per cent.) mercuric bromide solution—in contrast to the ineffective mercuric chloride at the same strength—may also be attributed to the mercuric bromide content, 0·4 per cent. being the minimum amount that kills the spores on adsorption. The bunt spores can only adsorb mercury ions from a mercuric acetate solution (the acetate ion cannot be adsorbed), and as the former are insoluble in lipoids they cannot penetrate and kill the spores but merely prevent their germination on a calcium nitrate solution; on soil the moisture dissolves the mercury. Thus the mechanism of action of the mercury ion agrees with that of the copper ion, but more of the former is necessary to prevent spore germination (3·5 per cent.) than of the latter (0·5 per cent.).

Sodium chloride reduces the action of mercuric chloride on the bunt spores by its effect in diminishing the mercuric chloride concentration. The spores treated with a sodium chloride-containing

solution of mercuric acetate do not germinate on damp soil, since the mercuric chloride molecules arising from the reciprocal action of the chloride and mercury ions destroy the spores.

BRESSMAN (E. N.). **Effect of bunt on height of Wheat plants.**—*Phytopath.*, xxii, 3, pp. 259–262, 1932.

The results [which are tabulated and briefly discussed] of a survey conducted in Oregon in 1928 of the relative height of wheat plants of ten varieties inoculated with 43 collections of bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetens*] showed that, in general, *T. foetens* (commonly known as 'high smut') produces a taller infected plant than *T. caries* ('low smut'). These differences, however, are not constant characters of the species, the height of the diseased plants also being influenced by varietal peculiarities and environmental conditions.

BONNE (C.). **Ergebnisse mit dem Kurzbeizverfahren in der Praxis.** [Results with the short disinfection process in practice.]—*Fortschr. der Landw.*, vii, 6, pp. 161–163, 2 figs., 1932.

Full details are given of the Germator (Miag, Braunschweig) apparatus for continuous seed-grain disinfection by the short disinfection process [*R.A.M.*, x, p. 445 ; xi, p. 36, *et passim*]. The treating capacity of the machine is 34 cwt. per hour (wheat and rye). Wheat bunt [*Tilletia caries* and *T. foetens*] was completely controlled with germisan in the above-mentioned apparatus, and even after months of storage the seed-grain with a moisture content of 18 per cent. showed no reduction of germinability nor any moulding [cf. ibid., x, p. 90].

WINKELMANN (A.). **Untersuchungen über die Haftfähigkeit von Trockenbeizmitteln.** [Investigations on the adhesive capacity of dusts.]—*Angew. Chemie*, xlv, 12, pp. 238–241, 1932.

The results [which are fully discussed and tabulated] of the writer's continued investigations on the adhesive capacity of dry seed-grain disinfectants [*R.A.M.*, x, p. 650] showed that this property is not influenced in any particular direction by the 'thousand grain weight' or moisture content of the cereal. It was further found that the use of different cereals does not affect the adhesive capacity of dusts to the extent that is generally assumed, so that it is quite in order to draw conclusions from tests with one cereal as to the probable degree of adhesion of the dust on seed-grain of other kinds. Such trials need not be conducted in special steeping machines ; small samples of the seed-grain and dust may be rotated in flasks (e.g., in the Wagner electric apparatus) at a velocity of 40 to 42 revolutions per minute. It is advisable to use three varieties of the cereal in order to exclude irregularities due to a special constitution of the seed.

In order to determine the efficacy of dusts in continuously working apparatus, the degree of adhesiveness should be tested on samples disinfected in flasks for $\frac{1}{2}$, 1, 2, and 3 minutes. Copper carbonate was found to be unsuitable for use in continuous dusting machines owing to its tendency to conglomeration on wheat seed-

grain infected by *Tilletia tritici* [*T. caries*] and poor adhesive capacity. Generally speaking, the results of laboratory tests with samples of dusts used against wheat bunt may safely be applied in practice, especially since, in the case of some of the [unnamed] preparations tested by the writer, the dust adheres better to infected than to non-infected seed-grain [cf. ibid., xi, p. 442].

FOËX (E.) & ROSELLA (E.). **Recherches sur le piétin du Blé au cours de la campagne 1930–1931.** [Studies on the foot rot of wheat during the season 1930–1931.]—*Comptes rendus Acad. d'Agric. de France*, xviii, 9, pp. 376–383, 1932.

Continuing their studies on foot rot of wheat in France during 1930–1 [*R.A.M.*, xi, p. 361], the writers again observed the virulent parasitism of *Cercosporella herpotrichoides*, especially on October sowings. This organism is responsible both for lodging and for a blight that often destroys the seedlings. *Ophiobolus graminis*, which was widely disseminated in the fields during the period under review, caused only slight and temporary injury to the plants in the writers' outdoor inoculation tests, but at a higher temperature (15° to 28° C.) under glass it seriously damaged the roots and coleoptiles. *O. herpotrichus* attacked 9 to 33 per cent. of the plants in the outdoor plots from March to May, the stem bases being considerably involved and lodging sometimes following. Under glass the plants were also infected by *O. herpotrichus*, but little damage ensued. *Leptosphaeria herpotrichoides* and *Wojnowicia graminis* also infected both the field and greenhouse plants.

HYNES (H. J.). **Foot rot of cereals. Observations on the disease in New South Wales.**—*Agric. Gaz. New South Wales*, xliii, 2, pp. 107–115, 1 fig., 1932.

The author states that his extensive investigations have shown that of the three major fungal diseases (*Helminthosporium sativum*, *Ophiobolus graminis*, and *Fusarium* sp.) [cf. *R.A.M.*, xi, pp. 291–294] which attack the roots and crowns of cereals, the foot rot caused by *H. sativum* is economically the most important in New South Wales, especially on wheat, the losses in which are due both to a seedling blight leading to impoverishment of stand and to a reduced yield in grain. In 1929, in particular, the disease attained epidemic proportions on wheat and oats in some parts of the State. Although no entirely resistant varieties of cereals are yet known there were indications that in seasons favourable to foot rot late maturing varieties of wheat are sometimes more severely attacked than the early ones, while oats are usually very resistant.

In giving a rather detailed description of the symptoms of the *H. sativum* foot rot on wheat, on which it may develop at any stage in the development of the host, and all the parts of which may be attacked (although usually it does not assume a conspicuous form until the plants are in head), it is stated that diseased plants do not necessarily exhibit a brownish discoloration at the base, although this symptom is usually present; often the attack is confined to the root system alone. The chief distinction between the symptoms of foot rot and take-all (*O. graminis*) in mature plants is the occasional development in the latter disease of perithecia on

the basal sheaths, and the presence of dark grey to blackish-brown, dull or shiny mycelial mats between the innermost sheath and the stem, and of light to dark brown spots or streaks at the base of the straw [cf. ibid., xi, p. 444].

Experiments with numerous isolations of *H. sativum* from various hosts in New South Wales definitely established the existence of several distinct physiological forms of the fungus, which vary in their geographical distribution and in their virulence to wheat and oat seedlings.

All the evidence collected by the author suggested that the development of the disease is largely dependent on conditions that favour the growth of the parasite and have a debilitating effect on the host. The system of feeding off the young cereal crops to cattle, in particular, was shown to predispose them to severe attacks of foot rot, as well as to frost injury. The disease is known to be favoured by high soil temperature and moisture, but local experiments indicated that the latter factor is more important than the former; this view is supported by the fact that wheats sown early in the season, when soil moisture is high, are usually more liable to the disease than later ones. Field and greenhouse experiments also showed that the amount of seedling blight is markedly reduced by increased applications of superphosphate to the soil, or by applying certain fungicidal dusts to the grain prior to sowing.

BENNETT (F. T.). **Fusarium species on British cereals. The Gibbosum group. I. F. scirpi Lamb. et Fautr.**—*Ann. of Appl. Biol.*, xix, 1, pp. 21–34, 1 pl., 2 figs., 1932.

Continuing his studies of species of *Fusarium* associated with cereal diseases in Great Britain [*R.A.M.*, x, p. 783], the author gives a very full morphological and cultural account of *F. scirpi* [ibid., iv, p. 274; x, p. 788], a mycelial form of which he obtained from the basal parts of *Triticum monococcum* and from roots of barley in the eastern counties, and to which he gives the varietal name *pallens* to distinguish it from a second variety isolated from the bases of barley grown at Woburn, to which the varietal name *nigrans* is given. A very detailed description of the differences in the morphology of the mycelial and pseudopionnotal forms of the two varieties and in the pigmentation produced by them in artificial substrata, especially rice and hard oat agar, is given and it is suggested that the inherent instability in the variety *nigrans*, resulting in the production of forms closely resembling the *pallens* type, indicates that it is genetically derived from the latter.

Both varieties were shown to be (with one exception) of similar pathogenicity to cereals, seedling blight due to them only resulting with seed-grain from plants attacked in the ear. Under abnormal conditions, e.g., with infected seed-grain grown in contaminated soil in a warm greenhouse, they attack wheat and barley seedlings severely, and oats to a lesser degree. Under reasonably good conditions for plant growth, however, the seedlings were able to withstand the fungus, and in some cases looked more vigorous than the controls owing to a stimulation of early tillering. These experiments, coupled with field observations, indicate that *F. scirpi*

is of little importance as a cause of seedling blight of cereals under ordinary field conditions. While both varieties are capable of attacking the ears of wheat, barley, and oats at any period between flowering and maturity, experiments showed that var. *pallens* is more virulent on these parts than var. *nigrans*, inasmuch as under conditions of high humidity during and immediately after the blossoming period, it reduced the germinability of the grains from 82 to 70 per cent. for wheat, and from 96 to 52 per cent. for barley. The infected grains, when used for seed, produced less vigorous plants and a reduced yield.

MARCHIONATTO (J. B.). **Las 'fusariosis' del Trigo y del Maiz.** [The 'fusarioses' of Wheat and Maize.]—*Bol. Min. Agric. Nac.*, Buenos Aires, xxx, 3, pp. 189–191, 1931. [Received June, 1932.]

Wheat scab (*Fusarium graminearum*), the symptoms of which are briefly described in popular terms, was first reported from Argentina in 1927 on the 38 M.A. variety (*Mem. Lab. Pat. Veg.*, p. 9, *Arch. Direc. Lab., Min. Agric. Nac.*, 1928), since when it has been observed in various parts of Buenos Aires and Entre Rios. The perfect stage of the fungus (*Gibberella saubinetii*) was collected on wheat in La Plata in 1928. In 1929 *F. graminearum* was also detected on maize shoots and ears.

F. moniliforme has been observed of recent years on maize (yellow and white varieties) in Buenos Aires, Santa Fé, and La Pampa. The symptoms observed in 1930 closely resembled those described by Valleau from the United States (*Kentucky Agric. Exper. Stat. Bull.* 226, 1920). So far it has not been possible to obtain the perfect stage (*G. moniliformis*) in pure culture.

MORWOOD (R. B.). **Report of Barley smut experiments, 1931.**—*Queensland Agric. Journ.*, xxxvii, 2, pp. 134–135, 1932.

The results [presented in tabular form] of experiments in 1931 in the Toowoomba district of Queensland showed that dusting the seed-grain with copper carbonate does not give control of covered smut of barley (*Ustilago hordei*). Of all the other standard seed-grain treatments tested, the best results in the control of this smut were obtained by dipping the grain for ten minutes in a solution of 1 pint commercial formalin in 30 galls. of water, spreading it out to dry, and then storing it in bags subjected to the same treatment before planting. It is pointed out that skinless barley, however, may be usefully treated against the smut with copper carbonate dust.

NEILL (J. C.). **Elimination of smut diseases from the malting-Barley crops of Ellesmere district.**—*New Zealand Journ. of Agric.*, xliv, 2, pp. 106–107, 1932.

Excellent results have been obtained in the control of seed-borne diseases of malting barley by the use of the hot-water treatment in the Ellesmere district of Canterbury, New Zealand [*R.A.M.*, ix, p. 516]. All the crops grown from seed 'direct from treatment' since the inception of the experiment in 1925 have remained free from smut [*Ustilago hordei* and *U. nuda*] and virtually free from

stripe [*Helminthosporium gramineum*]. The 'once removed from treatment' seed (that is, seed harvested from a crop grown from treated seed) also produced clean crops, as great care was taken from the beginning to prevent recontamination in handling. This seed, producing crops high in yield and quality of clean grain, came into general favour, and by 1929 nearly all the barley sown in the district was once or twice removed from the hot-water treatment.

Each year since 1925 surveys of the district showed a steady decrease in the incidence of these diseases. No loose smut [*U. nuda*] has been found since 1928–9. A trace of covered smut [*U. hordei*] was detected in two crops in 1930–1, but none in the 1931–2 season. A mere trace of stripe remained in 21 per cent. of the crops in 1931–2.

As during the 1931–2 season many growers used their own seed, much of which passed through the common travelling threshing mills without special precautions against reinfection, the entire freedom of all the crops from both smuts indicates that these diseases have been eliminated from the district. This result was accompanied by a large increase in yield per acre and a great improvement in the quality of the grain.

The method, thus, consists in gradually replacing infected seed within a definite area by distributing constantly renewed supplies of clean seed selected and bred under skilled supervision. In the present case success was achieved by close co-operation between the Plant Research Station at Palmerston North and the Canterbury Seed Company.

Reed (G. M.) & Stanton (T. R.). **Physiologic races of Ustilago levis and U. avenae on Red Oats.**—*Journ. Agric. Res.*, xliv, 2, pp. 147–153, 1 fig., 1932.

The results [presented in tabular form] of the authors' biological investigation of ten collections in 1929 of oat smuts (*Ustilago levis* [*U. kolleri*] and *U. avenae*) indicated the presence in them, besides some of the physiological forms of the fungi previously recorded [*R.A.M.*, ix, p. 372; x, p. 362], of a definite specialized race of *U. kolleri* exhibiting a high degree of virulence to the Fulghum variety of oats, a fact which may be of considerable economic importance in those States where this type of oats is extensively grown. So far no strain of covered smut has been found capable of infecting the Red Rustproof variety.

Storey (H. H.). **The filtration of the virus of streak disease of Maize.**—*Ann. of Appl. Biol.*, xix, 1, pp. 1–5, 1 fig., 1932.

Experiments in which leafhoppers (*Cicadulina mbila*) were fed through membranes, using a slight modification of Carter's method [*R.A.M.*, viii, p. 82], on the juice extracted from streak diseased maize plants [ibid., ix, p. 765; xi, p. 427] and passed through various filters, showed that at a P_H of about 6 the infective agent of the juice passes through Chamberland Li, Berkefeld V and N filters, and less freely through Chamberland L3, but not through a Seitz E.K. filter disk.

MAZÉ (P.) & MAZÉ (P. J.). **Sur l'infection du Maïs par le charbon (Ustilago maidis).** [On the infection of Maize by smut (*Ustilago maydis*).]—*Comptes rendus Soc. de Biol.*, cix, 10, pp. 825–827, 1932.

The writers claim that certain [unspecified] rare elements are indispensable to the growth of higher plants and give some details of experiments tending to show that maize varieties are more susceptible to the attacks of *Ustilago maydis* [*U. zeae*] in the absence of these elements.

MAZÉ (P.) & MAZÉ (P. J.). **L'inégale résistance des variétés de Zea mais à l'infection du charbon (Ustilago maidis).** [The unequal resistance of varieties of *Zea mays* to infection by smut (*Ustilago maydis*).]—*Comptes rendus Soc. de Biol.*, cix, 12, pp. 1087–1088, 1932.

In connexion with the differences in reaction to smut (*Ustilago maydis*) [*U. zeae*] shown by the six maize varieties used by the writers in their recent fertilizing experiment [see preceding abstract]. the theory is advanced that the so-called 'resistant' varieties are those which can rapidly replace any depletion of their organo-mineral reserves. A similar explanation is advanced to account for the rapid recovery of resistant vine hybrids from the incipient infections of *Peronospora* [*Plasmopara*] *viticola* that were observed in the wet season of 1930.

ELLIOTT (CHARLOTTE), WAGNER (F. A.), & MELCHERS (L. E.). **Root, crown, and shoot rot of Milo.**—*Phytopath.*, xxii, 3, pp. 265–267, 1 fig., 1932.

A number of typical milo sorghum varieties, e.g. Custer and Dwarf Yellow, in Texas, Oklahoma, New Mexico, Kansas, and California, have been showing symptoms of root, crown, and shoot rot, including dwarfing, lack of heading, a yellow discoloration of the leaves, and a dark red discoloration of the central root cylinder and of the interior of the crown. In severe cases, the disease may cause complete failure of the crops and is becoming a limiting factor in milo production. Steam or formaldehyde sterilization of the soil of infested fields resulted in completely healthy crops, while preliminary tests have shown that the above-mentioned symptoms may be induced by the addition of diseased soil or roots to the sterilized soil. These and other facts point to the parasitic nature of the disease, which appears to be confined to alkaline soils. A white bacterium and strains of *Fusarium* have been isolated from rotted plants but their pathogenicity has not been demonstrated. Kafirs, feteritas, sorgos, and Fargo Straightneck milo have been found resistant.

CHAUDHURI (H.). **Sclerospora graminicola on Bajra (Pennisetum typhoideum).**—*Phytopath.*, xxii, 3, pp. 241–246, 3 figs., 1932.

Using Hiura's method [*R.A.M.*, x, p. 23], the writer was able to induce germination in the oospores of *Sclerospora graminicola*, the causal organism of 'green-ear' disease of *Pennisetum typhoideum* in India [ibid., x, p. 517]. A small piece of moist filter paper bearing minute quantities of oospore powder was placed on the surface of

a large bit of moistened cotton in the bottom of a Petri dish, and a second similar layer in the lid, the space between the two being about half the height of the dish. The germ-tubes were not as long as those described by Hiura or Evans and Harrer [ibid., x, p. 306], and up to four were produced by one oospore. In the process of germination a portion of the outer coat may be ruptured and the inner coat protrude out as the germ-tube or the outer coat may split into several parts before germ-tubes are formed. The oospores were found to retain their viability for five years; inoculation experiments with these spores gave positive results, indicating that the disease is propagated through the soil.

Smith (F. E. V.). **Stem end rot of Citrus and its control in the packing house.**—*Journ. Jamaica Agric. Soc.*, xxxvi, 2, pp. 59–64, 1932.

A brief account is given of investigations conducted in Jamaica to ascertain to what extent the processes used in the citrus packing houses were a contributing factor to the development of stem-end rot [*Diplodia natalensis* associated with a *Phomopsis*: *R.A.M.*, xi, p. 365].

Much of the fruit when received from the orchards bears patches of sooty mould [*Capnodium* sp.]; this should be removed by thorough but not prolonged immersion in water, after which the fruit should be rapidly and efficiently dried. Drying by means of warm air reduced the rot on 12,000 grapefruit and 8,000 oranges treated by at least 50 per cent.

Colouring the fruit with excessive doses of ethylene gas also increased infection, the warm (80° to 87° F.), moist atmosphere of the average colouring room providing ideal conditions for the germination of the fungi. Fruit experimentally subjected to various dosages of ethylene invariably developed more stem-end rot than did similar but uncoloured fruit.

A thorough study was made of the effect of removing the fruit buttons as a means of control [cf. ibid., ix, p. 775]. As the conditions prevailing in the colouring rooms tend to promote almost 100 per cent. germination of the stem-end rot fungi it was considered that if such a high rate of germination could be induced, and the portion of the fruit containing the growing fungus removed, this might save the rest of each fruit. Accordingly, this procedure was carried out in combination with other treatments on some 40,000 grapefruit and 30,000 oranges; in every instance debuttoning after colouring reduced infection by at least 50 per cent., and in one experiment, affecting 80 boxes of oranges of a variety which had never shipped satisfactorily, the amount of rot that developed in the debuttoned fruit was only 1 per cent., as compared with 18 and 31 per cent. in the uncoloured and coloured but not debuttoned fruit, respectively. Examinations of Jamaica fruit upon arrival in London showed that whereas coloured and uncoloured fruit which had not been debuttoned carried from 4·5 to 6·5 per cent. rot, the fruit debuttoned after colouring had only four rotten fruits in eight boxes.

The final recommendations are as follows. The fruit should be picked in dry weather and quickly removed to the packing house.

It should then be subjected to two mild doses of ethylene (1 in 6,000), being well ventilated between the applications. The atmosphere in the colouring room must be kept moist. After 36 to 48 hours' exposure to the gas, the buttons should be removed; girls can easily be trained to do this with a small spoon, cheaply and without damaging the fruit. The importance of removing all dead wood from the citrus trees is again emphasized.

VENKATARAYAN (S.). **Phytophthora arecae, parasitic on Areca tops, and a strain of P. palmivora Butl. (P. faberi Maubl.) on a new host, Aleurites fordii.**—*Phytopath.*, xxii, 3, pp. 217–227, 4 figs., 1932.

Phytophthora arecae was isolated during recent investigations from dying *Areca catechu* tops in Mysore. The fungus formed oogonia and oospores measuring up to 32·9 and 28·1 μ in diameter, respectively, in mixed cultures with the heterothallic strain on *Santalum album* [*R.A.M.*, xi, p. 158] but not with that on areca nuts, thereby proving its identity with the latter strain. The sporangial measurements ranged from 26·4 by 22·2 to 62·7 by 39 μ, the average of 80 being 38·5 by 29·5 μ. Chlamydospores measuring 24 to 42 (average 34·3) μ were also formed.

The outer sheaths of diseased tops were found to contain the mycelium and sporangia of the fungus, and hyphae were also detected in the cells. Both the types of infection described by Coleman (*Mysore Dept. Agric. Myc. Ser. Bull.* 2, 1910) were observed, namely, a watery, slightly discoloured appearance at the base of the flower stalks and a rotting of the bases of the outer leaf sheaths, which could be readily pulled out.

In October, 1930, tung-oil (*Aleurites fordii*) seedlings developed water soaked, later brown spots on the leaves, over which the infection gradually spread, causing wilting and eventual defoliation. A species of *Phytophthora* was isolated from diseased material and grown on various standard media. Sporangia measuring 20 by 15 to 54·6 by 32·7 μ (average of 35 measurements, 32 by 23·6 μ) developed readily in sterile distilled water, and large numbers of chlamydospores (15 to 43·8, average 30·9 μ) were formed on quaker oats agar. Oogonia and oospores measuring up to 27·8 and 23·04 μ in diameter, respectively, were formed in mixed cultures of the *Phytophthora* from *A. fordii* and *P. arecae*. The antheridia were all of the amphigynous type. Positive results were given by a preliminary inoculation test with this *Phytophthora*, which is tentatively identified as a strain of *P. palmivora* [cf. ibid., xi, p. 206], on seedlings of *A. fordii* in the laboratory, the fungus being reisolated from the infected leaves.

KLOTZ (L. J.) & FAWCETT (H. S.). **Black scorch of the Date Palm caused by Thielaviopsis paradoxa.**—*Journ. Agric. Res.*, xliv, 2, pp. 155–166, 2 pl., 5 figs., 1932.

This is a morphological and histological account of the disease of the date palm (*Phoenix dactylifera*), a short note on which [in its form attacking the inflorescence of a tree in the Coachella Valley of California] was recently published [*R.A.M.*, x, p. 185],

and which fresh observations have shown to be widely spread in the locality of its first discovery and in Arizona. Conidia typical of the causal organism (*Ceratostomella paradoxa*) were also observed by the authors on preserved specimens of diseased date palm material collected in north Africa. In nature the disease was found attacking all parts of the date palm, with the exception of the roots and stem which, however, were shown in artificial inoculation experiments to be readily susceptible. In giving a detailed description of the lesions on the various organs of the tree, it is stated that the intensity of attack on the inflorescence is largely dependent on weather conditions preceding and during the time of emergence of the spathes, warm, moist, and windy weather probably favouring its distribution and development.

The optimum temperature for the growth of *C. paradoxa* in culture lies between 24° and 37·5° C. The brown spores apparently need a resting period before germination, while the hyaline conidia germinate immediately after formation. Examination of the tissues of a diseased frond petiole showed the fungus growing intracellularly in the tracheae and parenchyma, and intercellularly in the intercellular spaces but not in the middle lamellae.

Up to the present the losses caused by this disease are apparently of minor importance, but the severity of its attack in some cases indicates that it may become serious enough to require control measures, the chief among which should be the removal of all the affected fronds, leaf bases, and inflorescences, and the disinfection and protection of the pruning wounds with some fungicide. Preliminary experiments indicate that copper sprays or dusts, and various other chemicals may be effective.

Park (M.). **The effects of drought on Coconuts at Puttalam.**—*Trop. Agriculturist*, lxxviii, 1, pp. 11–14, 1 pl., 1932.

A brief account is given of a serious outbreak in the autumn of 1931 of a disease of coco-nut palms in the neighbourhood of Putalam, Ceylon, the symptoms of which corresponded very closely to those of the bronze leaf wilt in Trinidad [*R.A.M.*, vii, p. 717]. Examination of the diseased palms and of their roots failed to disclose the presence of any pathogenic organism. The author was present when the young leaves and cabbage of one of the affected palms broke off at the level of the bud, and immediate investigation showed that the tissue at the point of the break was soft and flaccid but not diseased. All the evidence collected locally pointed to the condition having been brought about by the severe drought which had prevailed in the region during the preceding six months (3·37 inches of rain as against the usual average of 8·12 inches). This view was confirmed by the observation that the disease was worst on poorly cultivated estates and on land which in wet weather becomes waterlogged and swampy. Young palms which were given good cultivation and were growing under the shade of older trees appeared to remain healthy. The author considers that the trouble should be amenable to control by all measures calculated to improve the tilth and the drainage of low-lying land, in order to induce deeper root development and thus to increase the resistance of the palms to conditions of drought.

MAYNE (W. W.). **Physiological specialization of Hemileia vastatrix B. and Br.**—*Nature*, cxxix, 3257, p. 510, 1932.

In the course of recent work at the Mysore Coffee Experiment Station on the reaction of a number of hybrids and selections of *Coffea arabica* to *Hemileia vastatrix* [*R.A.M.*, x, p. 239], indications were obtained of the existence of physiological specialization in this rust.

Inoculation experiments on detached leaves in the laboratory showed that one selection, *S.* 5/30, was completely resistant to spore collections made from the Coorg variety of *C. arabica*, though somewhat susceptible to infection in the field. In subsequent tests, four leaves from a susceptible Coorg tree and four from *S.* 5/30 were inoculated on different sides of the midrib with spore collections from the two hosts. In the Coorg leaves, 21 out of 24 inoculations with the Coorg spore collection were successful, and 17 out of 24 with *S.* 5/30. On *S.* 5/30 leaves, none of the 24 inoculations with Coorg spores was successful, while positive results were obtained in 23 out of 24 with the *S.* 5/30 collection. A number of similar experiments gave identical results. The infections caused by the two spore collections on the Coorg leaves and by the *S.* 5/30 collection on the foliage of the latter variety are stated to be morphologically indistinguishable.

BRYAN (MARY K.). **An atypical lesion on Cotton leaves caused by Bacterium malvacearum.**—*Phytopath.*, xxii, 3, pp. 263–264, 1 fig., 1932.

Cotton leaves collected in North Carolina in 1929 showed large, irregular, pale green or gray, necrotic areas apparently resulting from internal vascular disorganization. Sections through the lesions showed extensive infection of the vascular system, from which was isolated a strain of *Bacterium malvacearum* differing only in a few minor respects from the type species. Inoculations with subcultures from these isolations gave typical angular spot lesions on the leaf blades, petioles, veins, and bolls, as well as the above-mentioned large, pale spots. Parallel inoculations with a freshly isolated strain of *Bact. malvacearum* from typical angular spot gave the ordinary lesions characteristic of this disease but no systemic infection, of which there is, moreover, apparently no previous record [cf. *R.A.M.*, xi, p. 354]. Serious defoliation was reported to result from infection by the new strain of *Bact. malvacearum*.

ABBOTT (E. V.). **A powdery mildew on Cotton from Peru.**—*Mycologia*, xxiv, 1, pp. 4–6, 1 fig., 1932.

This is a very brief account of the powdery mildew of cotton in Peru, the causal fungus of which was identified as *Erysiphe malachrae* Seaver [*R.A.M.*, xi, p. 225] after comparison with the type from Porto Rico. In the cooler and moister valleys both the perithecial and the conidial stages have always been found together on the same plant, but in Piura, where the climate is much hotter and drier, the perfect stage has not been observed, indicating that the

absence of the latter is due to climatic rather than varietal peculiarities. The conidial stage, with elongate elliptical conidia, 35 to 60 by 14 to 30 μ, is believed to be *Ovulariopsis gossypii* [ibid., ix, p. 63] since morphologically it agrees very closely with Miss Wakefield's description [cf. also ibid., ix, p. 715]. The disease is stated to be of minor economic importance, and no control measures are recommended.

It is pointed out that although several powdery mildews were collected in the conidial stage on 47 species of cultivated and wild plants, this is the only *Erysiphe* which was found in Peru. In Porto Rico also this appears to be the only species found in the perfect stage, but it occurred there on a Malvaceous weed [*Malachra capitata*] and not on cotton.

Ehrlich (J.) & Wolf (F. A.). **Areolate mildew of Cotton.**— *Phytopath.*, xxii, 3, pp. 229–240, 4 figs., 1932.

Latin and English diagnoses are given of *Mycosphaerella areola* n.sp., the ascigerous stage of *Ramularia areola* (*Cercosporella gossypii*) [*R.A.M.*, ix, p. 32; x, p. 775], which is a common cause of mildew on cotton (*Gossypium hirsutum*, *G. barbadense*, *G. peruvianum*, and *G. vitifolium*) in the south-eastern United States and many other parts of the world.

In addition to the conidial stage, borne on the lower and occasionally also the upper surfaces of the pale to yellowish-green lesions on the leaves and bracts, the authors found spermogonia appearing as black spots on the lesions in November and December. In the early stages they are sclerotium-like bodies, 28 to 75 μ in diameter, composed of compact, thick-walled cells, of which the innermost are the first to become spermatiferous. Each protoplast undergoes separation into a number of rod- or bone-shaped spermatia, after which the cell wall disintegrates and the spermatia are liberated in a matrix consisting of cytoplasm and disintegrating cell walls. The process continues centrifugally until only the outer layers of thick-walled cells remain. With the apical opening of the spermogonium the spermatia, which measure 2·4 to 4 by 0·4 to 2 μ, are exuded in a viscous mass through the ostiolum. The perithecia, which develop sparsely in April on the areas previously occupied by the conidia and spermogonia, are dark brown, with a slight papilla, and measure 70 to 80 μ in diameter. The asci measure 35 to 40 by 6 to 8 μ, and the biseriate, elongated ascospores, slightly constricted at the septum, 12·4 to 15·6 by 3·2 to 3·8 μ.

Considerable difficulty was experienced in obtaining pure cultures of the cotton mildew organism, but a small proportion of the conidia germinated in tap or distilled water to which fragments of cotton leaves or traces of sugar were added. Isolations from ascospores were made by inverting agar plates over decaying leaf fragments on moist blotting-paper in the tops of Petri dishes; on transference to potato-agar slants colonies of the conidial type developed but neither conidia nor spermogonia were formed. Inoculation experiments gave consistently negative results, no doubt primarily due to the absence of suitable moisture conditions, as indicated by the observation that wet seasons are necessary for field infection.

FIKRY (A.). **Investigations on the wilt disease of Egyptian Cotton caused by various species of Fusarium.**—*Ann. of Botany*, xlvi, 181, pp. 29–70, 2 pl., 5 graphs, 1932.

This is a detailed account of the author's investigation (started in 1927) under controlled conditions in London and Cambridge of the fungi associated with the wilt disease of cotton in Egypt [*R.A.M.*, x, p. 379; xi, p. 178]. The examination of diseased material sent in indicated that the trouble is very widely spread throughout Lower Egypt (where the annual reduction in yield due to it is estimated at over 10 per cent.) and is also present in certain localities of Upper Egypt. In cotton seedlings the main symptom of the disease is a brown discoloration of the fibro-vascular bundles of the roots and stems, while the first outward sign of infection which appears under favourable conditions is a characteristic yellowish spotting (termed mosaic) of the cotyledons and leaves.

Inoculations with the various strains of fungi which were isolated from affected plants originating from Lower Egypt and from three localities in Upper Egypt showed them to be highly parasitic on Sakel cotton, but those isolated from cotton plants received from three other localities of Upper Egypt proved to be non-pathogenic. The study of these organisms showed them to belong to the genus *Fusarium*, and three of the pathogenic forms were definitely identified by Wollenweber as *F. orthoceras* (Upper and Lower Egypt), *F. vasinfectum* var. *inodoratum* (Lower Egypt) [ibid., xi, p. 41], and *F. angustum* (Upper Egypt). *F. solani* (Upper Egypt) was not pathogenic. Under controlled conditions the pathogenic forms were capable of severely attacking cotton seedlings at temperatures between 21° and 30° C., a range which includes the optimum for growth of the host; no infection occurred at 33° or 36°, and the minimum soil temperature for infection was about 18°. A soil moisture content of 50 to 60 per cent. appeared to be the most favourable both for the growth of the cotton seedlings and for the intensity of attack and subsequent development of the disease. The highest degree of infection was obtained in English and Egyptian soils of P_H 7·8 to 8·3. The incubation period of *F. orthoceras* in the host was 5 or 6 days at temperatures ranging from 20° to 30°.

Further experiments showed that filtrates of the culture fluids in which *F. orthoceras*, *F. vasinfectum* var. *inodoratum*, and *F. solani* were grown, and extracts from the mycelium of these species, caused wilting of young cotton shoots, including the variety Ashmouni which is resistant to wilt disease. The toxic substance responsible for the wilting is thermostable and non-volatile. It was also established, contrary to Rosen's opinion [ibid., vi, p. 291], that nitrites which may be present in the culture solutions or mycelial extracts are not a cause of the wilting.

HERBERT (F. W.) & HUBBARD (J. W.). **Verticillium wilt (hadromycosis) of Cotton in the San Joaquin valley of California.**—*U.S. Dept. of Agric. Circ.* 211, 7 pp., 3 pl., 1932.

The disease of cotton caused by *Verticillium albo-atrum* which was recently described by Shapovalov and Rudolph from the

neighbourhood of Wasco in California [*R.A.M.*, ix, p. 380] is stated to have spread in 1930 to many places in the San Joaquin valley, where it is causing appreciable losses to the crop; one grower, in particular, estimated that the disease reduced his yield by one-third on a 40-acre field in 1929, for which reason he replaced cotton by lucerne in the next year. The first external symptom is a distinct mottling of the leaves with pale yellowish, irregular areas at the margins and between the main veins; in time these areas become more whitish and necrotic, and finally die and turn brown; later still the leaves fall, usually only leaving a few small ones at the ends of the branches. Simultaneously with the appearance of the first leaf symptoms, the wood at the base of the main stalk may show a browning of the vascular system, later becoming very pronounced.

Observations in 1930 on an experimental plot with 48 varieties of cotton showed that with the exception of Pima (Egyptian) cottons, none of the varieties tested exhibited any resistance; the Pima plants remained practically normal throughout, although examination at the end of the season revealed that most of the Pima plants in the infected area showed the brown discoloration of the wood characteristic of the disease. While no definite control measures are recommended for the present, a rotation of cotton with lucerne or some grain crops is suggested as a practical means of avoiding losses in the infected fields.

Sartory (A.), Sartory (R.), & Meyer (J.). **Une Microsiphonée à pigment rouge isolée de glandes sous-maxillaires.** [A microsiphonaceous fungus with red pigment isolated from the submaxillary glands.]—*Comptes rendus Soc. de Biol.*, cviii, 38, pp. 1186–1188, 1932.

From an infiltration of the sub-maxillary glands of an 11-year-old girl, the writers isolated a fungus forming a red pigment on potato juice at 27° C. and characterized by hyphae 0·5 to 0·7 μ and spherical arthrospores 0·9 μ in diameter. The intraperitoneal inoculation of a guinea-pig with an emulsion of the organism in physiological serum proved fatal in nine days, the parasite being recovered from the liver and spleen. The fungus is placed in the genus *Actinomyces* as *A. allenbachii* n. sp. A cure was effected by treatment with progressive doses of iodide.

Sartory (A.), Sartory (R.), & Meyer (J.). **Étude d'un Actinomyces isolé d'expectorations chez une femme suspecte de tuberculose pulmonaire.** [A study of an *Actinomyces* isolated from the sputum of a woman suspected of pulmonary tuberculosis.]—*Comptes rendus Soc. de Biol.*, cviii, 38, pp. 1188–1190, 1932.

From the sputum of a 56-year-old woman suffering from chronic bronchitis and suspected of pulmonary tuberculosis, the writers isolated a fungus characterized by branched hyphae 0·35 μ and arthrospores 0·6 μ in diameter. The only medium on which growth was made was bouillon with maltose, the optimum temperature for

development being 24° to 26° C. An emulsion of the organism in physiological serum was inoculated into two guinea-pigs with fatal results and it was recovered from the various internal organs affected. The fungus is referred to *Actinomyces pulmonalis* Roger, Bory, et Sartory 1909.

Negroni (P.). **Estudio micológico sobre cincuenta casos de micosis observados en Buenos Aires.** [A mycological study of fifty cases of mycosis observed in Buenos Aires.]—*Rev. Univ. Buenos Aires*, Ser. 2, XXIX, iv, viii, 3, 399 pp., 1 col. pl., 75 figs., 1931.

A comprehensive account is given of the writer's examination of fifty cases of human mycosis in Buenos Aires, Argentine Republic, with full clinical details and extensive notes on the morphology, biology, and taxonomy of the organisms concerned [*R.A.M.*, xi, p. 43].

Coccidioides immitis and *Rhinosporidium seeberi* [ibid., x, p. 662] are tentatively referred to the Chytridineae, notwithstanding their incapacity to form zoospores, which is probably due to adaptation to the parasitic mode of existence on man and certain animals.

Cooper (G. W.). **Outline of culture character studies of an undescribed species of Cryptococcus.**—*Amer. Journ. Trop. Med.*, xii, 1, pp. 97–100, 1932.

Morphological and biological studies were made of an apparently undescribed species of *Cryptococcus* isolated at the Western Reserve University School of Medicine, Cleveland, Ohio, from one out of 102 cases of black tongue, the remainder being of the common 'pseudo' or 'non-fungoid' type.

The fungus, to which the name of *C. quasilinguae-pilosae* n. sp. is given, is a yeast-like, double-contoured, ovoid cell, 3·9 to 8·7 μ in diameter, as compared with 3 to 6 μ for *C. linguae-pilosae* [*R.A.M.*, v, p. 301]. Acid was formed on dextrose, maltose, galactose, and levulose. There was no gas formation on any of the sugar media or litmus milk. Slight to marked pellicle formation was observed on various fluid sugars.

Grigorakis (L.). **Morphologie et taxonomie du Spiralia mentagrophytes ou champignon à cultures plâtreuses.** [The morphology and taxonomy of *Spiralia mentagrophytes* or fungus of chalky cultures.]—*Comptes rendus Soc. de Biol.*, cix, 3, pp. 186–188, 1932.

The examination of a culture of *Spiralia* (*Trichophyton* or *Ctenomyces*) *mentagrophytes* [*R.A.M.*, vii, p. 99; x, p. 243] revealed the presence in the 'spindles' of 3 to 12 septa from which arose short filaments producing numerous aleuria. The 'spindles' are considered to be really only detached fragments of mycelium of variable length and they may be completely absent from pleomorphic cultures. Whorls with serrated spirals were present in large numbers and it is these bodies which doubtless led Langeron and Milochevitch to classify the fungus as a *Ctenomyces*, whereas

this genus was created by Eidam for species with perithecia and asci, unknown in the fungus in question.

FABIANI (G.). **Influence de la vaccination du milieu et l'addition d'antivirus sur la croissance d'Achorion schönleini.** [Influence of the inoculation of the medium and the addition of antivirus on the growth of *Achorion schönleini.*]—*Comptes rendus Soc. de Biol.*, cix, 5, pp. 403–404, 1932.

The inoculation of Sabouraud's medium with a white *Staphylococcus* completely prevented the growth of *Achorion schönleini*, sown 48 hours later. On the other hand, the development of the fungus was promoted by the addition to the medium of Besredka's staphylococcic antivirus (10, 25, or 50 drops per tube).

BALINA (P. L.) & NEGRONI (P.). **Intertrigo des orteils et onyxis dus à un nouveau parasite.** [Intertrigo of the toes and onychia due to a new parasite.]—*Ann. dè Dermatol.*, Sér. VII, iii, 1, pp. 8–20, 11 figs., 1932.

The causal organism of intertrigo and onychia of the toes in Buenos Aires, previously referred to the genus *Cephalosporium* [*R.A.M.*, x, p. 459], is now regarded as occupying a position among the Mucedineae close to *Verticillium*.

SCOTT (J.). **Foil-wrapped cheeses: some deterioration factors.** —*Food Technology*, i, 7, pp. 276–277, 4 figs., 1932.

Crustless cheeses wrapped in tinfoil and packed in cardboard containers have been found to be seriously affected by a fungus belonging to the Perisporiaceae, which had evidently originated on the paper labels, penetrated the tinfoil, and reached the cheese [cf. *R.A.M.*, viii, p. 675]. The labels were puffy and drab-coloured, the printed colours having run into one another, the tinfoil was corroded by the chemical reactions of the mould, and the cheese emitted a foetid odour and was 'soapy' in texture, probably through the action of lipase on the fatty constituents. The omission of labels from wrapped cheeses is recommended.

WATERMAN (ALMA M.). **Rose diseases: their causes and control.**—*U.S. Dept. of Agric. Farmers' Bull.* 1547, 20 pp., 10 figs., 1932.

This is a revised version of the writer's account of the principal fungous and bacterial diseases of roses in the United States [cf. *R.A.M.*, vii, p. 446].

GRIEVE (B. J.). **Rose diseases and their control.**—*Journ. Dept. Agric. Victoria*, xxx, 2, pp. 92–94, 104, 2 figs., 1932.

The diseases dealt with in this further instalment of the author's series of articles on rose diseases and their control [*R.A.M.*, x, p. 792] are leaf scorch (*Septoria rosae*) [ibid., vi, p. 33; viii, p. 604], which has not yet been recorded in Australia, leaf spot (*Cercospora rosaecola*) [ibid., vi, p. 487; ix, p. 613], recorded in Victoria, *Phyllosticta rosae*, reported from Victoria in 1895 and Queensland

in 1911, *P. rosarum*, doubtfully recorded in Australia in 1904, and *Mycosphaerella rosigena*, reported from Queensland in 1915–16.

Cooley (L. M.). **Black rot of Stocks.**—*Phytopath.*, xxii, 3, p. 270, 1932.

In 1929 and 1930 greenhouse stock (*Matthiola incana* var. *annua*) plants near Knoxville, Tennessee, were affected by a wilt due to *Bacterium campestre* [*Pseudomonas campestris*], which is believed to have been hitherto reported on this host only from Germany (*Arb. K. Biol. Anst. für Land- und Forstwirtsch.*, v, p. 489, 1907). The pathogenicity of the organism was proved by inoculation experiments.

Brooks (F. T.). **A disease of the Arum Lily caused by Phyllosticta richardiae, n. sp.**—*Ann. of Appl. Biol.*, xix, 1, pp. 16–20, 1 pl., 1932.

This is a brief account of a serious disease of the arum lily (*Richardia africana*) observed in 1930 in the Scilly Isles in the open, and sent in 1931 to the author from plants grown under glass in Yeovil, Somerset. The chief symptom is the appearance of brown blotches on the leaf blades, petioles, stalks of the inflorescences, and the white spathes. When young the spots on the leaf blade and petiole are often surrounded by a narrow yellow zone. With age the blotches may extend until practically the whole leaf is destroyed, and occasionally the central parts of the spots fall out.

Isolations from diseased material yielded a fungus to which the name *Phyllosticta richardiae* n.sp. is given; it is pointed out that this binomial was already used by Halsted in 1894 for a similar disease of the arum in New Jersey, but as no diagnosis was then given, it is considered to be a *nomen nudum*. The fungus is characterized by roughly spherical, brownish-black pycnidia, 120 to 180 μ in diameter, with a circular ostiole, 20 to 30 μ across. The pycnospores are oval, often pointed at one end, and measure 3·7 to 7·3 by 2·7 to 3·7 μ (average 5·5 by 3·5 μ.). A brief account of the cultural characters of the fungus on various media is also given, and its diagnosis in English is appended.

Inoculation experiments showed that the organism is capable of infecting unwounded arum leaves under conditions of maintained high humidity, at temperatures fluctuating between 13° and 24° C. The petioles were also infected through wounds. In the author's opinion the disease should be easily controlled under glass by adequate ventilation; in the field its spread may be checked by the prompt removal of all diseased foliage and flowers, crop rotation where possible, and suppression of weeds, as there is a possibility of the fungus being perpetuated on the latter.

Hemmi (T.) & Kurata (S.). **Notes on three diseases of Azaleas.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 1–12, 2 pl., 2 figs., 1931. [Japanese summary.]

In the summer of 1930 various species of *Rhododendron*, including *R. obtusum* and *R. ledifolium*, at Kyoto, Japan, were affected by a disease causing the development of brown, spherical,

elliptical, or irregular patches, 3 to 15 by 2 to 10 mm., on both leaf surfaces. The dark brown to black, globose, subglobose, or irregular pycnidia, measuring 70 to 112 μ in height and 48 to 131 μ in diameter, are generally formed in the palisade tissue underlying the epidermis of the upper surface of the spots. The hyaline to pale olive, smooth, guttulate, straight or very slightly curved, continuous, ellipsoid, subglobose, ovoid, or irregular pycnospores measure 7·15 to 12·8 by 4·3 to 7·15 μ (average 10 by 5·7 μ). This description agrees with the characters of *Phyllosticta maximi* [*R.A.M.*, iii, p. 721]. An immature ascigerous fungus, believed to be *Venturia rhododendri*, was found in conjunction with the former and with *Pestalozzia* sp. on a specimen collected in October, 1930.

R. obtusum and *R. lateritium* suffered from a disease characterized by the presence on both leaf surfaces of circular or irregular spots, those on the upper being chestnut- or dark brown while on the lower they were light to yellowish-brown, sometimes with greyish centres, 1 to 10 mm. in diameter, usually 2 to 5 mm. The causal organism was identified as *Cercospora handelii* Bub., a new record for Japan. The short, simple, olivaceous, erect conidiophores, arising in fascicles from a small, tubercular, brown stroma, bear linear, curved, pale olivaceous, 5- to 14-septate conidia, 48 to 134·4 by 2·3 to 4·3 μ at the basal portion, the average dimensions being 70 to 115 by 3·2 μ.

R. macrosepalum, which grows wild near Kyoto, is liable to severe infection by *Melasmia rhododendri* (not hitherto reported on this species), forming spherical or irregular, black, shiny spots, less than 3 mm. in diameter, on one or both leaf surfaces. At an advanced stage these spots (the stromata of the fungus) become confluent and the affected leaves turn brown and shrivel, often remaining on the twigs until the following summer. The unicellular conidia produced in pycnidia inside the stromata during the summer are hyaline, fusoid, ovoid-fusoid, or allantoid, and measure 2·2 to 4·8 by 1 to 2 μ, the original measurements given by P. Hennings and Shira (*Engler's Bot. Jahrb.*, xxviii, p. 259, 1900) being 3 to 3·5 by 0·5 to 0·7 μ. The ascigerous stage is not formed until the winter or following spring. The elongated apothecia mature in the late spring or early summer; their openings first appear as curved cracks, gradually widening and turning grey and sometimes having a cup-shaped aspect. The subclavate or cylindrical, straight or slightly curved, short-stipitate or subsessile asci measure 99·2 to 147·2 by 11·4 to 14·3 μ and contain eight hyaline, elongated wedge-shaped, cylindrical, or elongated fusiform, straight or slightly curved, mostly uni- (occasionally bi- or quadricellular) ascospores, generally arranged biseriately but sometimes irregularly, and measuring 21·5 to 44·8 by 2·8 to 3·8 μ. The abundant septate, filiform paraphyses are mostly longer than the asci and 1 to 2·5 μ wide, their upper portions being incurved, hooked, or more often coiled.

From these characters the ascigerous stage of *M. rhododendri* was readily identified as a *Rhytisma*. The name *R. rhododendri* being already appropriated for a different fungus, the present organism is designated *R. shiraiana* n. sp.

Birmingham (W. A.) & Broadfoot (H.). **Powdery mildew of the Apple. Experiments for its control.**—*Agric. Gaz. New South Wales*, xliii, 2, pp. 147–150, 3 figs., 1932.

After outlining the geographical distribution and economic importance of powdery mildew (*Podosphaera leucotricha*) [*R.A.M.*, x, p. 604] in New South Wales, the authors state that in experiments since 1926 at Batlow good control of the disease was obtained by tipping all the diseased shoots, removing the infected spurs, and treating the trees with sulphur compounds, all of the latter that were tested having proved effective. In tests from 1928 to 1930 at Kentucky dritomic, atomized, or colloidal sulphur, followed by applications of lime-sulphur gave the best control of the mildew in 1928, but in the other two seasons the best results were obtained with lime-sulphur alone.

Cooley (J. S.). **Botrytis stem infection in Pears.**—*Phytopath.*, xxii, 3, pp. 269–270, 1932.

Botrytis stem infection of stored pears, which was prevalent in the 1930 crop at Hood River, Oregon [*R.A.M.*, xi, p. 115], is characterized by a sharp line of demarcation between the blackened tip and the sound tissue. The diseased portion is usually soft, water soaked, and liable to crumble on rubbing. As the storage season advances the discoloration passes downwards to the fruit. Pears infected by stem rot should not be kept for the late market, since the fungus spreads rapidly from one fruit to another. The lots showing severe stem infection (up to 18 per cent.) came from orchards bearing a heavy cover crop of vetch or clover, the dead and dying stems and leaves of which constitute a favourable substratum for the growth and sporulation of *Botrytis*. The airborne spores invade the freshly picked fruit through the abscissed stem ends.

Anderson (H. W.). **Spraying experiments for disease control in 1931.**—*Trans. Illinois State Hort. Soc.*, lxv (*1931*), pp. 170–183, 1 graph, 1932.

Peach leaf curl [*Taphrina deformans*: *R.A.M.*, x, p. 248] was controlled in Illinois during 1931 by a dormant spraying with lubricating oil–Bordeaux, dendrol–Bordeaux, 4840 Dormant oil-lime sulphur (1 in 15), 4840 Dormant oil-flotation sulphur (16 in 100), and lime-sulphur 1 in 8. Oil combinations are necessary owing to the prevalence of San José scale on the peach trees. The lubricating oil recommended for mixing with Bordeaux is a light-grade oil of sp. gr. at 20° C. of 0·87 to 0·93, volatility at 110° C. for 4 hours not above 10 per cent, and viscosity at 100° F. 90 to 250 seconds (Saybold test). To each 100 galls. of 6–10 (hydrated lime)–100 Bordeaux, 3 galls. oil may be added. The oil may be emulsified by boiling with 1 to 2 lb. potash fish oil soap (40 per cent. soap) plus ¼ gall. water to each gallon of oil. A cold-mixed lubricating oil-Bordeaux emulsion [stated elsewhere to be made by pumping together equal parts of the oil and 6–10–100 Bordeaux mixture, passing this through the pump at least twice, and adding the necessary amount to make 100 galls. Bordeaux containing 1½

or 2 per cent. oil as required] may be used instead of the boiled soap emulsion.

Excellent control of apple scab [*Venturia inaequalis*] was again given by the ferrox, thylox, and dry wettable flotation sulphurs [ibid., x, p. 644], five applications being made between 22nd April and 15th June. In cases of mild infection 5 lb. of sulphur instead of 10 lb. per 100 galls. (the standard strength) was found to be ample for control. In one test, blotch [*Phyllosticta solitaria*] on the Ben Davis variety was also well controlled by flotation sulphur. Dry lime-sulphur (6 lb. per 100 galls. in the pre-bloom and calyx and 3 lb. in the 1- and 3-weeks sprays) gave excellent control of scab and showed much less injury than liquid lime-sulphur. Injury to foliage was observed following the 5-weeks spray on a number of the sulphur-treated plots and was attributed to the burning of the sulphur at high temperatures.

McWhorter (O. T.). **Peach leaf curl.**—*Better Fruit*, xxvi, 8, p. 25, 1932.

To control peach leaf curl [*Taphrina deformans*: see preceding abstract] in Western Oregon conditions growers are recommended to spray during December or before 15th January with Bordeaux mixture 6–6–50, it being essential to give the trees a thorough covering of spray before the buds burst. In Eastern Oregon a commercial lime-sulphur solution 1 in 8 may be used before the winter buds swell where control of insect infestation is desired.

Anderson (H. W.). **Problems on spray injury to the Peach.**—*Trans. Illinois State Hort. Soc.*, lxv (*1931*), pp. 454–468, 2 figs., 1932.

In certain seasons, such as 1930 and 1931, the loss to Illinois fruit growers from spray injury may be greater than that from the pests against which the treatment is applied. Peaches suffer from three types of spray injury, viz., (1) a marginal burn, followed by a 'corking off' process at the union of the healthy and injured portions; (2) a spotting or shot-hole effect in the interveinal regions, involving areas one-quarter to one-half an inch in diameter, turning purple on the under side and often dropping out; and (3) curling or crinkling of the leaf margins and midrib, usually associated with the foregoing but sometimes occurring independently. Defoliation is commonly a secondary effect of spray injury due to disturbance of the entire physiological activities. Twigs may develop brown areas near the leaf base, sometimes extending into the bark and causing canker formation at the nodes, while under certain conditions the exposed face of the fruit shows greyish, later dark brown or black, necrotic lesions. In an experimental plot sprayed with kaolith, a fluosilicate preparation, the fruit tended to ripen prematurely at the suture. This condition, to which the name 'soft suture' was given, had been observed in previous tests for the control of bacterial spot [*Bacterium pruni*: ibid., xi, p. 355].

Under Illinois conditions, all the above-mentioned types of spray injury except the last appear to be primarily due to lead arsenate,

the harmful effects of which may be minimized by the use of freshly slaked or fresh hydrated lime instead of magnesium lime and by the addition of zinc sulphate to the mixture (8 lb. zinc sulphate and 8 lb. lime per 100 galls. water) [cf. ibid., x, p. 225].

TEHON (L. R.). **Observations on Peach yellows in Illinois.**—*Trans. Illinois State Hort. Soc.*, lxv (*1931*), pp. 183–195, 1932.

Peach yellows [*R.A.M.*, xi, p. 354] is definitely known to have occurred near Philadelphia about 1791, though it was apparently recognized as a destructive disease at least forty years earlier. In Illinois the first serious outbreak took place in 1927, but reliable reports indicate that the condition was observed as early as 1886. Hitherto the sole method of mechanical transmission of yellows from diseased to healthy trees has been by budding, a fact that led to the suspicion of spread by nursery stock. However, an inspection during the last five years of some 250,000 peach trees aged 1 to 22 years showed that none of the 103 affected by yellows was less than five years old, the highest incidence of infection (7·5 per cent. of the cases) being in the oldest individuals. These data, taken in conjunction with closely similar records from Pennsylvania, appear to bring the role of nursery stock in the dissemination of yellows within very narrow limits, and it seems more probable that a number of common weeds constantly found in or near peach orchards are the major sources of infection. None of the common orchard weeds showed the yellow symptoms in their entirety, though *Erigeron canadensis* presents the typical growth habit of aster yellows [ibid., x, p. 601], while a peculiar type of witches' broom, strongly reminiscent of the willowy growth of yellows on the peach, affects *Campsis* [*Tecoma*] *radicans*. The possibility of insect transmission, e.g., by *Myzus persicae*, is briefly discussed.

In addition to ordinary yellows, three other types of the disease have been recognized in Illinois, namely, benign, in which the condition spreads slowly, if at all, and causes no noticeable decline in the health of the trees; non-infectious, characterized by the most marked and complete symptoms of yellows but not spreading from one tree to another; and mosaic-type, in which the affected individuals show the typical mosaic mottling of the leaves as well as the willowy growth and early ripening fruit associated with yellows.

DIPPENAAR (B. J.). **Fruit spots of the Kelsey and other Plum varieties.**—*Farming in South Africa*, vi, 72, pp. 525–526, 3 figs., 1932.

The valuable Kelsey plum, which is largely grown for export in the western Cape Province, is stated to be liable to three different types of spotting, known as sun scorch, Kelsey spot, and drought spot. Sun scorch spots occur chiefly on green fruit exposed to the north or north-west, whereas Kelsey spots, which are ¼ to 1½ in. in diameter, develop both on shaded and exposed fruit early in January, three or four weeks before the plums are ready for picking. The small, deep-seated, brown spots due to drought are generally not more than ¼ in. in diameter, and are found overlying

convex cavities, due to the rupture of the affected tissues, in the flesh of young, green plums towards the end of November or early December.

In the Kelsey variety 60 per cent. of the fruit of a tree or 50 per cent. of the trees in an orchard may be affected by these types of spotting, which render the plums unsuitable either for export or for the local market. Up to 20 per cent. of the fruit of the Burbank variety may be similarly diseased, the corresponding figures for Gaviota and Santa Rosa being 5 and 2 per cent., respectively. The October Purple and Prune d'Agen varieties are markedly susceptible to sun scorch but apparently not to Kelsey or drought spot.

No fungi or bacteria have been found associated with the types of spotting under discussion, which are tentatively attributed, as a result of three seasons' observations, to a lack of nitrogenous food, an inadequate supply of soil moisture, and high temperatures at the approach of maturity. Control measures should be based on the correction, as far as possible, of these conditions.

Hansen (H. N.) & Davey (A. E.). **Transmission of smut and molds in Figs.**—*Phytopath.*, xxii, 3, pp. 247–252, 1932.

The results [which are discussed and tabulated] of investigations in California on the transmission of fig spoilage organisms [*R.A.M.*, x, p. 678] showed that the following mites and thrips act as carriers: the predaceous mites, *Sejus pomi* and *Cheyletus* sp. which feed on the common fig mite *Eriophyes fici*, and the thrips, *Frankliniella tritici*, *F. tritici* var. *californicus*, *Thrips bremneri*, *Liothrips ilex*, *Heliothrips fasciatus*, and *Leptothrips mali*. All the mites and at least two of the thrips, viz., *F. tritici* and *L. mali*, breed within the figs of both edible and capri crops. The thrips, unlike the mites, are not confined to the eye region but wander throughout the interior of the fig, and are thus probably more effective carriers of the spores of the various fungi, yeasts, and bacteria associated with spoilage of figs.

Nyenhuis (E. M.). **Experiments with 'export' of Papaws.**—*Farming in South Africa*, vi, 72, pp. 499–500, 2 figs., 1932.

The examination, after three weeks' storage at the Low Temperature Research Station, Capetown, at 36°, 40°, and 45° F. (90 per cent. humidity), of 207 boxes of Northern Transvaal papaws at two stages of maturity, showed that mould develops rapidly at the two former temperatures before the fruit has time to ripen. At 45° a fair amount of ripening takes place but the wastage is serious.

Wright (C. W. B.) & Woodman (R. M.). **Problems confronting the sprayer. I. The volume of liquid needed to spray trees of various sizes and shapes.**—*Chem. News*, cxliv, 3749, pp. 116–122, 1 diag., 1 graph, 1932.

A tabulated account is given of the writers' investigations at a fruit farm in Norfolk in 1927 on the amount of spray fluid necessary to cover apple trees of different varieties, sizes, and shapes.

Groups of Lord Derby, Worcester Pearmain, Lane's Prince Albert, and Bramley's Seedling trees were sprayed when the foliage was at different stages of growth with a hand-power barrel pump connected to a 6 ft. lance with a medium nozzle. The wash consisted of soft dyke water and 0·75 per cent. fish-oil soft soap, and the volume applied to each group was accurately obtained in every case by subtracting the measured residue left in the barrel after a spraying from the initial amount.

The development of the foliage was found to play a large part in modifying the amount of spray fluid required to cover a tree. The first application (on 20th April) practically corresponded to a dormant spraying; as the leaves expand, the volume of liquid per unit volume for any variety of apple usually rises to a maximum and then decreases with later successive sprayings, the date of the maximum volume naturally being determined by varietal habit. The amount of spray used per unit volume of tree decreases with the size of the latter, apparently owing to the difficulty of thoroughly wetting the topmost portions of large trees and also the large branches. Especially when the foliage is heavy (as in the early June application) the tendency of the average workman sprayer is to wet only the external surface of the head of the tree, the internal branches and twigs readily escaping.

The average volume of spray per tree (in pints) for Worcester Pearmains was 5·57 on 20th April, 6·56 on 25th May, and 2·50, 4·07, and 6·25, respectively, for three groups treated on 7th to 8th June. For Lord Derby the amounts used were 9·24 in April, 11·27 and 10·67 on 5th and 23rd May, respectively, and 1·57, 2·58, 4·50, 7·31, and 9·67, respectively, for five groups sprayed on 7th to 8th June. For Bramley's Seedling: 13·64 in April, 13·73 and 27·17, respectively, for two groups on 5th May, 10·94 on 23rd May, and 3·86, 6·00, 9·58, 11·50, and 13·25, respectively, for five groups on 7th to 8th June. For Lane's Prince Albert: 3·25 in April, 3·94 and 9·07 on 5th May, 4·13 on 23rd May, and 2·56, 3·43, 4·92, and 5·70 on 7th to 8th June.

Wright (C. W. B.) & Woodman (R. M.). **Problems confronting the sprayer. II. The volume of spray passing through nozzles of varying diameter at varying spraying pressures.** —*Chem. News,* cxliv, 3751, pp. 146–147, 1 graph, 1932.

In the authors' spraying experiments on apple trees [see preceding abstract] an attempt was made to ascertain the effects caused by the use of nozzles of varying diameters with varying pump pressures, plain water being the liquid chosen for these trials.

A Drake and Fletcher nozzle with three interchangeable, case-hardened steel disks, $\frac{1}{16}$, $\frac{3}{32}$, and $\frac{1}{8}$ in. in diameter, respectively, was used. A Vernier gauge was attached to the nozzle so that observations could be made at two definite swirl chamber depths, $\frac{19}{64}$ and $\frac{25}{64}$ in., representing the minimum and maximum compatible with easy, successful working. The nozzle was attached to a horizontal, rigid rod lance fed from a pressure spraying outfit invented and manufactured by C. E. Lack of C. Lack & Sons, Ltd., Cottenham. The pump pressures used were 30–300 lb. / sq. in.,

ascending by units of 30. Known volumes of water were sprayed, the temperature of which during the tests (July, 1931) ranged from 15° to 20° C.

It was found that for any given disk, the greater the depth of swirl chamber, the longer and more acute-angled was the jet thrown and the coarser the spray; with any given disk and a fixed depth of swirl chamber, the lower the pump pressure, the shorter and coarser the jet. The coarser the nozzle or the greater the pump pressure, the quicker the delivery; with any given nozzle, the deeper the swirl chamber, the less the period of delivery and the effect of pump pressure.

At a pump pressure of 30 lb. the times required to spray 10 galls. at $\frac{19}{64}$ in. depth of swirl chamber were 26 minutes 50 seconds, 15 m. 10 s., and 12 m. 5 s. for the fine, medium, and coarse nozzles, respectively, the corresponding figures at $\frac{25}{64}$ in. being 20 m. 5 s., 10 m. 35 s., and 5 m. 35 s., respectively. At 300 lb., $\frac{19}{64}$ in., the times for the fine, medium, and coarse nozzles were 12 m. 35 s., 8 m. 25 s., and 5 m. 30 s., respectively, the corresponding figures at $\frac{25}{64}$ in. being 9 m. 40 s., 4 m. 55 s., and 2 m. 45 s., respectively.

MARTIN (H.). **Studies upon the copper fungicides. I. The interaction of copper sulphate with calcium hydroxide.**—*Ann. of Appl. Biol.*, xix, 1, pp. 98–120, 4 graphs, 1932.

The purpose of the investigation described in some detail in this paper was to determine the chemical and physical properties of the precipitate of Bordeaux mixture, which render its efficacy in the control of certain fungal diseases of plants superior to that of all its commercial substitutes in paste or dust form. It was shown that at ordinary temperatures, the initial product of the interaction of cupric sulphate and calcium hydroxide solutions is the $4CuO.SO_3$ basic sulphate. In the presence of amounts of calcium hydroxide in excess of 0·75 equivalent, the basic sulphate is slowly decomposed with elimination of the sulphate radicle and the formation of a blue hydrated cupric oxide or cupric hydroxide which retains, by adsorption, part of the sulphate radicle. The hydrogen-ion concentration curve for the cupric sulphate-calcium hydroxide reaction shows that permanent alkalinity of the supernatant liquid is not reached until equimolecular amounts of calcium hydroxide have been added. The cupric hydroxide formed from the basic sulphate is stabilized by adsorbed sulphate ions. Continued washing of the precipitate with water freed from carbon dioxide removes the adsorbed sulphate and the excess calcium hydroxide, and the precipitate is thus dehydrated to form the nigger brown hydrated cupric oxide. Since the spray deposit of Bordeaux mixture on plants exposed to natural washing by rain remains blue, it appears that dehydration of the precipitate deposited by spraying is prevented by some chemical or physical change which occurs on drying. Experiments showed that physical factors are not concerned and that the blackening occurred when carbon dioxide was excluded from the washing water.

The investigation is considered to suggest that the good adhesive properties of the Bordeaux mixture precipitate are due to the formation *in situ* of a protective copper-containing deposit by the action,

primarily, of carbon dioxide. The failure of some of the substitutes may be caused by the inertness of their constituents towards the chemical changes which occur after spraying, and there was evidence that these changes may profoundly affect the value of sedimentation tests as criteria for the fungicidal efficacy of various Bordeaux mixtures.

THORNBERRY (H. H.). **The effect of certain dyes on plant pathogenic microorganisms.**—*Trans. Illinois State Acad. Sci.*, xxiii, 3, pp. 200–203, 1931.

Methyl violet [*R.A.M.*, ix, p. 580] was tested as a spray against bacterial spot of peach (*Phytomonas* [*Bacterium*] *pruni*) [see above, p. 520] at Illinois University during 1928–9. Toxicity studies in the laboratory indicated that the growth of the causal organism is inhibited at a concentration of 1 in 50,000. The field tests were made with a dilution of 1 in 2,000 which completely prevented the spread of infection.

Further laboratory tests were carried out with twelve dyes on seven micro-organisms [which are listed]. A comparison of the chemical structure of related dyes showed that a particular grouping in the molecule is associated with the selective bacteriostatic power. Thus, malachite green, which is more toxic than methyl violet, contains one methylated amino group instead of two. The inhibitory action which was manifested by all but three of the dyes apparently does not result in the death of the cell, which may resume its normal functions on the removal of the dye.

In preliminary trials on the penetration of dyes into tissue, apple segments were submerged in 1 in 100,000 solutions of methyl violet, gentian violet, and malachite green. After one hour the dyes were found to have penetrated about 1·5 mm. through the cut surface. The cells in the region of the absorbed dye were disjoined apparently as a result of enzymatic activity stimulated by the dyes.

ARNAUD (G.) & ARNAUD (MADELEINE). **Traité de pathologie végétale.** [Treatise on plant pathology.] Tome I. Vols. I, II, et Atlas. (Encyclopédie Mycologique, Tomes III, IV, V.)—1900 pp., 34 col. pl., 702 figs., Paris, Paul Lechevalier et fils, 1931.

These three well-produced and lavishly illustrated volumes which form Tome I of the authors' Traité de pathologie végétale, while they are also Tomes III, IV, and V of Lechevalier's Encyclopédie Mycologique, contain 702 original figures in addition to 34 coloured plates (reproduced separately in Tome V of the Encyclopédie) by Mme S. Ballings, the intention being to have about 100 coloured plates in the completed Traité. The entire work will consist of three parts of unequal length. The first part is an introduction designed to familiarize readers who are not phytopathologists with the technical ideas elaborated in the second part. The second, and principal, part of the work is devoted to full description and study of the various diseases, arranged under hosts, and so treated as to be understood by laymen as well as specialists, one of the chief aims of the authors being to give an essentially practical account of all the aspects of each disease. Tome I, besides the introduction, contains the section of the second part dealing with the diseases of

woody plants other than forest or ornamental trees or shrubs. The third and shorter part is to complete and conclude the second, and will deal more fully with those purely scientific questions which are mentioned in the introduction or briefly referred to in the mycological study of the pathogen which ends the article on each disease. Tome I, Vol. I contains the introduction of 100 pages, covering briefly such points as the history of plant pathology, the classification of plant diseases, general methods of prevention and control, fungicides and the requisite apparatus for their application, and climatology; there is also a bibliography of works dealing with this aspect of the matter. The same volume also contains sections on vine diseases, general considerations on diseases of fruit trees, and a detailed account of the diseases of the apple.

As an example of the full and comprehensive treatment accorded to the various subjects the section on vine diseases may be cited. This consists of 542 pages with nearly 200 figures. It begins with an historical account of vine cultivation in Europe and North America (the latter is brief) and proceeds to a very valuable survey of all the cultivated varieties, the production of hybrids, a general list of vine diseases and general considerations applicable to them, and their prevention and control. This is followed by articles on the diseases taken separately. Mildew (*Plasmopara viticola*) is accorded nearly 80 pages, dealing in turn with general considerations, history, symptoms, conditions necessary for infection, control, and a mycological study of the pathogen, each section, as throughout the book, having its own bibliography of references in English, French, German, and Italian.

Tome I, Vol. II deals with diseases of pears, quinces, and other pomaceous fruits, stone fruits, bush fruits, strawberries, and Mediterranean trees. This last section includes among other economic plants, olives, citrus, mulberry, loquat, and date palms, the various diseases being less exhaustively and authoritatively examined than those in the preceding part, in accord, no doubt, with their relatively lesser importance in France. Citrus diseases, for example, are allotted only 57 pages, though the existing literature is sufficiently cited to enable the fuller accounts of the various diseases to be traced. One omission which may be noted is the absence of a specific reference to the occurrence of *Phytophthora hibernalis* on citrus in Europe [cf. *R.A.M.*, v, p. 296; ix, p. 105].

So far as concerns the subject matter dealt with in these three volumes, the work is the most comprehensive, complete, and best illustrated treatise that has yet appeared. Special commendation may be given to the numerous excellent bibliographies following each section of the work, which are comprehensive, up to date, and pleasingly free from typographical errors.

SORAUER (P.). **Handbuch der Pflanzenkrankheiten. Dritter Band. Die pflanzlichen Parasiten. Zweiter Teil. Fünfte, neubearbeitete Auflage.** [Handbook of plant diseases. Volume III. The vegetable parasites. Part II. Fifth revised edition.]—viii + 948 pp., 195 figs., Berlin, P. Parey, 1932.

Nearly four years have elapsed since the publication of Part I

of the section on vegetable parasites in Sorauer's 'Handbook of plant diseases' [*R.A.M.*, vii, p. 733], the long delay being due to the death of one co-editor (Noack) and the withdrawal of another (Höstermann). In the present work Dr. O. Appel was assisted by Drs. Wollenweber, Laubert, Pape, Köhler, Zillig, Münch, Richter (who prepared the comprehensive subject index of nearly 50 pages), and Stapp. A great many of the illustrations and much of the text are new, while the references to phytopathological literature, given in the form of copious footnotes, have been brought up to date.

The greater part of the present volume deals with the diseases caused by Basidiomycetes (including the rusts and smuts) and Fungi Imperfecti, these two sections comprising a total of 830 pages. This main part is followed by short chapters dealing with parasitic algae (11 pages), lichens (10 pages), and parasitic phanerogams (27 pages). The diseases of tropical plants are fully discussed under the various fungi concerned. Altogether this treatise, in its present amplified and extensively documented form, is unquestionably one of the best works on the subject that has hitherto appeared.

RÉGNIER (R.). **L'organisation moderne de la protection des végétaux d'après l'exemple de quelques grands pays.** [Modern organization of plant protection as exemplified by some important countries.]—*Ann. des Epiphyties*, xvii, 2–3, pp. 113–247, 30 figs., 4 maps, 1931. [Received May, 1932.]

In this paper the author reviews in some detail (but chiefly from the entomological point of view) the organization of the plant protection services in the United States, Great Britain, Germany, Czecho-Slovakia, Holland, and Belgium, as seen by him during personal visits to these countries. From the experience thus gained he attempts to formulate a plan for the creation of a national plant protection service in France.

MCARDLE (R. E.). **The relation of mycorrhiza to conifer seedlings.**—*Journ. Agric. Res.*, xliv, 4, pp. 287–316, 2 pl., 7 figs., 1932.

After a brief review of the literature dealing with the nature and functions of mycorrhiza in plants, the author states that his continued investigation of these formations in the Saginaw Forest, Michigan [*R.A.M.*, x, p. 482], during which notes were taken on their seasonal occurrence and their relationship to the hydrogen-ion concentration of the soil and humus, showed that 14 species of Basidiomycetes [a list of which is given] were nearly always associated with the roots of the Norway spruce (*Picea excelsa*) and the northern white pine (*Pinus strobus*). *Tricholoma personatum*, *Lycoperdon gemmatum*, *Clitocybe rivulosa* var. *angustifolia*, and *C. diatreta* were induced by a technique devised by the author [details of which are given] to form mycorrhiza under controlled conditions on the roots of *Picea excelsa* and *Pinus strobus* seedlings grown on synthetic nutrient media. The experiments showed that the formation of mycorrhiza is independent of the presence or absence of nitrogen or of the form in which it is present in the

nutrient solutions. There was some evidence that when the nitrogen is present only in organic compounds, especially complex proteins, the seedlings show signs of nitrogen starvation which is not alleviated by the presence of mycorrhiza on their roots. It was further shown that the formation of mycorrhiza depends on the contact of the right species of fungal mycelium with the growing root tip, the elongation of which ceases on the formation of the mycelial mantle. In some of the cases examined the internal mycelium was both inter- and intracellular, in others it was only between the cells. No penetration of the hyphae was found in older roots. Maintenance of the fungi in pure culture for over a year did not apparently reduce their ability to form mycorrhiza rapidly and in large numbers. Attempts to induce the formation of mycorrhiza with species of *Penicillium*, *Rhizopus*, and *Mucor* failed.

The investigation is stated to have given no conclusive proof that the presence of the mycorrhiza is either helpful or harmful to the seedlings. No trace of the digestion of the intracellular hyphae could be found. Nevertheless the writer is of opinion that seedlings and probably also larger trees are benefited by the association with the fungi.

CAPPELLETTI (C.). **Sulla resistenza dello stolofillo di 'Tulipa silvestris L.' alla penetrazione dei miceli.** [On the resistance of the stolophyll of *Tulipa silvestris* L. to the penetration of mycelia.]—*Rendic. R. Accad. Lincei*, Ser. 6, xiii, 12, pp. 937–940, 2 figs., 1931.

In his studies of the fungal invasion of the seeds of Liliaceae [cf. *R.A.M.*, xi, p. 387] the author investigated the mode of resistance shown by the underground organ characteristic of certain Liliaceae and termed the 'stolophyll' by Chiarugi (*Nuov. Giorn. Bot. Ital.*, N.S., xxx, pp. 172–199, 1923). This organ, having apparently leaf and stem functions, resembles a thick, whitish, almost cylindrical root.

Sections of different parts of the stolophyll of *Tulipa silvestris* plants in no instance showed any mycelium in the parenchymatous tissues, though the roots of the same plants were constantly heavily infected in the cortical parenchyma by mycorrhizogenous mycelia.

That the stolophyll escapes infection may partly be due to its rapid growth and the short time it remains in the soil, but seems chiefly to depend on its anatomical structure. It is protected in the epidermis by a continuous, thin, distinct, crinkled cuticle, underneath which the cellulose membrane is thickened, forming a continuous and highly protective covering all round. Beneath the epidermis there is a layer of probably collenchymatous cells, though the thickening is not marked at the angles and is mainly confined to the cell walls parallel to the surface of the organ. A very similar structure exists in the cavity of the stolophyll, which is also bounded by a cuticle underneath which is a very thick cell wall. Inside the cavity hair-like growths develop, the hairs being always covered by cuticle. Wounds made in the epidermis healed with great rapidity, a deep corky layer being formed.

When bulbs of *T. silvestris* were grown in Knop's nutrient solution and inoculated with a *Penicillium*, *Mycogone tulipae*, a *Rhizoctonia* isolated from *Nothoscordum fragrans* Kunth, and a fungus taken from the roots of lucerne, the roots rapidly became infected, but the stolophylls remained unaffected, although frequently their epidermis was covered with mycelium.

Leemann (A. C.). **The problem of active plant immunity.**—*Zentralbl. für Bakt.*, Ab. 2, lxxxv, 17–20, pp. 360–376, 1932.

After a general discussion of the problems involved in the conception of active plant immunity with particular reference to the production of antibodies in animals and plants, the writer describes a series of experiments conducted at the Division of Plant Industry, Pretoria, to ascertain whether the 'holistic' properties of the cell [cf. J. C. Smuts, 'Holism and Evolution'] can be modified, by the introduction into the soil of certain substances, in such a way as to obtain a state of increased resistance. The test plant used was the Early Gluyas wheat variety, and the pathogen was *Helminthosporium sativum*, a highly virulent strain of which was cultured on a medium consisting of 10 gm. each of lactose, galactose, and maltose, 0·5 gm. each of asparagin and glycocol, 2 gm. KH_2PO_4, 1 gm. $MgSO_4$, 3 gm. $FeSO_4$, agar 20 gm., water 1,000 gm., and 20 c.c. soil extract from 100 c.c. soil + 200 c.c. water. It was evident from the cultural experiments that the fungus prefers amino acids to nitrates or nitrites. The wheat seedlings (of which there were about 12,000 altogether, 50 in each Petri dish of 22 cm. diameter, containing a layer of soil about 1 cm. deep) were inoculated by smearing conidial suspensions of *H. sativum* on the stems and leaves and were kept covered with bell jars to maintain a saturated atmosphere. The substances to be tested were thoroughly mixed with the soil in the dishes.

A fungus extract was made by adding water to an agar culture of *H. sativum*, which was kept at 47° C. for four days, when seeds were soaked in the extract for 21 hours at ordinary temperature. A first lot of seeds was immediately placed in soil with and without this extract. After the seedlings developed they were then inoculated with *H. sativum* and showed very heavy infection. A second lot of the soaked seeds was dried for 14 days and then germinated, the resulting plants showing very weak infection when inoculated, i.e., a decreased susceptibility. An undetermined fungus was grown on Raulin's medium, which was eventually poured off and treated with a mixture of adsorbents: kaolin, ortho-aluminium hydroxide, ferrihydroxide, infusorial earth, silica, tricalcium phosphate, and animal coal. The liquid was then filtered, the filtrate and residue on the filter being added separately to the Petri dishes and thoroughly mixed with the soil. It was found that *H. sativum* was able to infect the plants treated with the filtrate slightly on the stems and severely on the leaves, while with the adsorbents the reverse was the case. Evidently, therefore, the adsorbents separate two components of the fungus secretion, one of which increases while the other decreases the susceptibility of the plants. This test shows clearly that secretions of fungi penetrate into plants, and that these substances, on incorporation

into the protoplasm, can modify its susceptibility to the selected pathogen. Similar experiments [which are described] with *Bacterium fluorescens* and other organisms also produced, under certain conditions, an increased resistance in the wheat plants to infection by *H. sativum*.

Diseased plants attacked by *H. sativum* were washed and left in the water for 21 hours. Seeds were treated with the extract thus obtained and the seedlings inoculated with the pathogen, heavy infection resulting in all cases. The soil on which diseased plants had grown was treated with tap water and the extract tested for its effect on susceptibility. When this extract was added to the soil in the dishes it increased the susceptibility of the seedlings to subsequent inoculation with *H. sativum*, but when seeds were soaked in the extract only slight infection was obtained on inoculation. An alcohol extract of the soil was also made, stirred well, and the supernatant cloudy liquid filtered. The coarse parts left behind in the vessel were tested as before and resulted in severe infection, as did also a water extract of them, whereas the fine particles on the filter and the water extract of that residue gave only slight infection. The immunizing effect of the fine particles is attributed to the micro-organic flora that they contain. This test shows that the immunizing factor of the soil is water-soluble.

The mycelium of *H. sativum*, grown on a liquid medium, was killed by heat and left to decompose in an incubator at 25°; after a fortnight it turned brown and was added to the soil, where it caused a marked access of resistance to *H. sativum* infection in the wheat plants grown in this soil. Susceptibility was augmented, however, by the killed but undecomposed, and by the living mycelium of *H. sativum*. In a test with the above-mentioned undetermined fungus, the susceptibility of the seedlings to *H. sativum* was increased by the addition to the soil of pounded mycelium mixed with sand or killed on a water bath, while a decrease of susceptibility followed the immersion of the seed in an aqueous extract of the mycelium, living or dead. The substance producing the immunizing effect would thus appear to be thermostable. The mycelium of the undetermined fungus was submitted to a number of extracting liquids, which were allowed to evaporate at ordinary temperature before the extracted substances were added to the soil. The distilled water extract allowed moderate infection on the stems and severe on the leaves; that from alkaline water, acid water, methanol, and amyl alcohol, permitted severe infection. When the treated mycelium itself was added to the soil strong infection was secured with all treatments except ethyl alcohol (very weak) and distilled water (similar to the extract).

An increase of susceptibility was produced by the interaction of *H. sativum* with various organisms, while with others a decrease was obtained [cf. ibid., x, p. 719]. The tests were made by growing the other organisms in a liquid, filtering through a Chamberland filter, and inoculating the filtrate with *H. sativum*. The culture liquid in which *H. sativum* was thus grown was then added to the soil. The reverse experiment, in which *Bact. fluorescens* was grown in the filtrate of *H. sativum* cultures, gave increased susceptibility.

Immunizing substances were also produced in the lipasic fermentation of oils and phosphatides (soy-bean oil or lecithin, plus lipase).

The underlying idea in these investigations is that the aim of active plant immunity should be to modify the holistic properties of the cell within its fluctuation value (limits within which the cell itself is not injured) through substances added to the soil so as to obtain a state of higher resistance in plants grown in the soil so treated.

DAVIS (W. H.). **Single spore isolation.**—*Proc. Iowa Acad. Sci.* (*1930*), xxxvii, pp. 151–159 [undated, received May, 1932].

A brief historical review is given of the methods of single spore isolation developed by bacteriologists and plant pathologists from de Bary (1872) to Dickinson (1926) [*R.A.M.*, v, p. 377] in connexion with the study of the life-history, polymorphism, physiology, parasitism, and classification of micro-organisms.

KLAPP (E. L.). **Ökologie und Abbau der Kartoffel.** [Ecology and degeneration of the Potato.]—*Pflanzenbau, Pflanzenschutz u. Pflanzenzucht*, viii, 9, pp. 213–218, 1932.

In connexion with a general survey of the problem of potato degeneration in relation to ecology in Germany [*R.A.M.*, xi, p. 395], the writer presents and briefly discusses the various hypotheses of the etiology of the virus diseases, and also gives full details of a system of experimentation (adapted both to large- and small-scale observations) on the influence of different places of origin and cultivation on the health and productivity of the progeny.

CLEVELAND (C. R.). **The relation of insects to the transmission of Potato leafroll and Tomato mosaic in Indiana.**—*Indiana Agric. Exper. Stat. Bull.* 351, 24 pp., 2 figs., 1931. [Abs. in *Exper. Stat. Record*, lxvi, 3, pp. 238–239, 1932.]

Under Indiana conditions potato leaf roll is transmitted chiefly by the aphid *Myzus persicae* and the leafhopper *Empoasca fabae* [cf. *R.A.M.*, x, pp. 49, 163, 747, 812]. The pink and green potato aphid (*Macrosiphum solanifolii*) [*M. gei*], a potential carrier, is not sufficiently abundant to function as a major factor in transmission. Cage tests indicated that the potato flea beetle (*Epitrix cucumeris*) is probably not an important factor.

It is believed that extremely heavy infestations of leafhoppers may result in less spread than lighter infestations, as by their adverse effect on the physiological processes of the plant the former inhibit the transfer of virus to the tuber. Aphids, on the other hand, caused less direct damage and therefore the more numerous they were the more actively they transmitted leaf roll to the progeny.

M. persicae is believed to be mainly responsible for the insect transmission of tomato mosaic from tomato to tomato, and to a less extent from wild hosts to tomatoes. *Empoasca fabae*, the onion thrips [*Thrips tabaci*], and the common red spider [*Tetranychus telarius*] appeared to be capable of transmitting tomato mosaic

but are considered unimportant. Insects, chiefly *M. persicae*, are held responsible for at least 50 per cent. of the annual spread of tomato mosaic in Indiana.

CLINCH (PHYLLIS). **Cytological studies of Potato plants affected with certain virus diseases.**—*Scient. Proc. Roy. Dublin Soc.*, N.S., xx, 15, pp. 143–172, 5 pl., 1932.

This is a detailed account of the author's cytological investigation of potato plants affected with certain virus diseases, namely, simple mosaic, interveinal mosaic, crinkle, aucuba mosaic, streak, and leaf roll. The results showed that in the case of the three first-named diseases the chlorotic areas of the leaves are thinner than the green ones, the cells within the discoloured areas frequently contain fewer and smaller chloroplasts than normal, and in mosaic-infected leaves excessive quantities of tannin and fat are present in the chlorotic cells. In aucuba mosaic the chlorosis is caused by loss of pigment associated with an excess of starch in the plastids. In crinkle the cells of the green areas are often abnormally long and narrow, and they are closely set together, probably owing to retarded growth of the veins and of the chlorotic cells surrounding them ; in the other diseases the cells of diseased and healthy parts are similar to one another. In leaf roll the cell contents of young and apparently still healthy leaves do not show any visible abnormality, but as the disease develops abnormal starch accumulations arise in certain cell groups throughout the lamina, until finally the chloroplasts of every cell are bloated with starch and abnormally large starch grains are present in the petiole and the stem.

Intracellular vacuolate inclusions (X-bodies), similar to those described by other workers on virus diseases [cf. *R.A.M.*, xi, p. 335], were found to be present in the chlorotic areas of leaves affected with simple mosaic, interveinal mosaic, crinkle, and streak, but not in aucuba mosaic or leaf roll plants, nor in healthy leaves. These bodies were most abundant in interveinal mosaic and crinkle plants that were suffering from the prolonged effects of the diseases ; in young diseased plants they were inconspicuous. They were shown to contain mitochondria like the cytoplasm of a normal cell, and to be associated in certain stages with numerous fatty globules. It is considered that the cells containing the X-bodies are in a state of low vitality, and there was evidence in the later stages of a breakdown of the lipoid-protein complex of their cytoplasm. The suggestion is made that the X-bodies arise as a result of as yet unknown changes in the viscosity of the cytoplasm, and they are considered to be an effect and not a cause of disease.

MARTIN (W. H.). **Certified seed Potatoes and seed disinfection.**—*Amer. Potato Journ.*, ix, 3, pp. 33–37, 1932.

Replying to numerous complaints from New Jersey potato growers concerning the presence of scab [*Actinomyces scabies*] and scurf (*Rhizoctonia*) [*Corticium solani*] in certified seed, the writer points out that small percentages of both these diseases are generally permitted by the various States supplying New Jersey,

as well as by Canada [*R.A.M.*, x, p. 745]. Only in New Jersey was any modification of the tolerance regulations made during 1931; the present permissible limits are 10 per cent. of tubers with an average of more than five shallow scab spots exceeding in the aggregate an area of 1 in. in diameter; 5 per cent. with more than three deep scab spots covering the same area; and 10 per cent. showing shallow or deep scab. Not more than 10 per cent. of the tubers may show over five scurfed areas or more than 50 sclerotial bodies covering a total area of more than 1 in. in diameter; more than 5 per cent. with 25 sclerotial bodies covering an aggregate of 2 in.; or more than 10 per cent. of the tubers with any form of *C. solani*.

Schorffeste und schorfanfällige Kartoffelsorten. [Potato varieties immune from and susceptible to scab.]—*Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, xii, 3, pp. 18–19, 1932.

A list is given, based on three years' official tests at the Biologische Reichsanstalt, showing the reaction of a number of standard potato varieties to scab [*Actinomyces scabies*: *R.A.M.*, xi, p. 320]. The 'practically immune' group contains four varieties, viz., Ackersegen, Dauerragis, Jubel, and Marschall Hindenburg; the fairly resistant 15, among which are Albabona, Arnica, Berlichingen, Erdgold, Maibutter, Prof. Gisevius, Rotkaragis, and Tannenberg; the less resistant 13, represented by Bismarck, Cellini, Datura, Deodara, Goldfink, Lichtblick, Prozentragis, and Vesta; and the susceptible 79, including Allerfrüheste Gelbe, Alma, Beseler, Daber, Edeltraut, Eigenheimer, Frühe Ertragreiche, Hörnchen, and Rosen, Glückauf, Goldappel, Gratiola, Heimat, Industrie, Juli, Konsum, Kuckuck, Max Delbrück, Odenwälder Blaue, Parnassia, President, Preussen, Roode Star, Silesia, Wekaragis, Winterragis, and Wohltmann.

Lindfors (T.). **Mot Potatiskräfta immuna Potatissorter.** [Potato varieties immune from Potato wart.]—*Landtmannen, Tidskr. för Landtmän*, xv, 12, pp. 250–251, 1932.

Official experiments have been in progress in Sweden for some years to test the reaction of a number of standard potato varieties to wart disease [*Synchytrium endobioticum*: *R.A.M.*, ix, p. 670]. In this paper the writer gives particulars of the yields obtained in 1930 and 1931 from some of those recognized as immune. Among the starch varieties, Hellena, Parnassia, and Wekaragis proved superior to Wohltmann, which was used as a control. Experiments in different parts of the country with some immune varieties in comparison with Birgitta and Up-to-Date showed that King George V, Majestic, Rosafolia, and Erdgold may be relied upon for good yields in central Sweden where Ackersegen and Hindenburg were less satisfactory than in the south. Preliminary tests in the north also gave promising results as regards King George V, Rosafolia, and Majestic. So far none of the immune varieties appears to be quite as suitable for the early market as Early Puritan and Rose; Kuckuck, Juli, and Dargill Early are about equal in productivity to Early Puritan but mature some days later.

CHAMBERLAIN (E. E.). **Corticium disease of Potatoes. III. Laboratory and field methods for testing the efficiency of seed treatments.**—*New Zealand Journ. of Agric.*, xliv, 1, pp. 42–47, 1932.

In this further paper on the *Corticium* [*solani*] disease of potatoes [*R.A.M.*, xi, p. 260] the author states that the efficacy of the various seed tuber treatments recommended for its control may be usefully determined in the laboratory by testing the sclerotia taken from treated and dried tubers for germination on potato dextrose agar; any sclerotia remaining viable after treatment should be growing by the end of the fifth day. Experiments over two years in New Zealand showed, however, that the results of such tests do not always agree with those of field trials, in which the percentage of infection is frequently much higher than that which might be inferred from the corresponding laboratory experiments. In discussing the possible causes of this discrepancy, such as the presence and spread of the fungus in the fields, it is suggested that probably the survival after treatment of some of the sclerotia in soil is due to some factor or factors not present on potato dextrose agar.

CHAMBERLAIN (E. E.). **Corticium disease of Potatoes.**—*New Zealand Journ. of Agric.*, xliv, 2, pp. 122–126, 1 fig., 1 graph, 1932.

Concluding his investigations into the *Corticium* [*solani*] disease of potatoes in New Zealand [see preceding abstract] the author gives brief details of further attempts at control made with the acidulated corrosive sublimate treatment as well as with organic mercury compounds and states that the evidence obtained as a result of the whole investigation indicates that the benefits accruing from seed treatment are doubtful, since the disease appears to have little effect on the yield, the treatment itself is risky and may depress the yield, and the chances of keeping a line reasonably clear without treatment every second or third year are small. Of the nine tests of acidulated corrosive sublimate on *Corticium*-infected potatoes, only two produced a significant increase in yield while one gave a significant reduction. Seed treatment by ordinary growers, therefore, is not regarded as justifiable. Brief directions as to chemical treatment are given for growers wishing to obtain clean potatoes for special purposes, e.g., for exhibition.

ROTHMALER (B.). **Über die Herznekrose bei der Kartoffelsorte 'Böhms Allerfrüheste Gelbe'.** [On heart necrosis in the Potato variety 'Böhms Allerfrüheste Gelbe'.]—*Thesis, Univ. of Jena*, 48 pp., 1931. [Abs. in *Fortschr. der Landw.*, vii, 11, p. 305, 1932.]

The Böhms Allerfrüheste Gelbe potato variety is characterized by a tendency to necrosis of the cells in the central portion of the tuber, often leading to the development of a cavity, and a study of the condition was undertaken by the writer. The disturbance was definitely shown to be of non-parasitic origin and to be preceded by the production of an oxidase in the pith, this process being apparently peculiar to the variety under observation. The 'heart necrosis' of Böhms Allerfrüheste Gelbe is considered to be entirely

distinct from the 'hollow heart' of other varieties with a high starch content [*R.A.M.*, x, p. 749], which is attributed to the purely mechanical rupture of the interior of the tuber under the influence of an abnormally wet late summer or early autumn following a lengthy dry spell [ibid., v, p. 516]. Field experiments showed that the brown discoloration of the medulla typical of heart necrosis is favoured by abundant supplies of nitrogen, wide spacing, and alternating wet and dry periods. [A summary of this paper is given in *Pflanzenbau*, viii, p. 304, 1932.]

Cook (H. T.). **The diseases of Sweet Potatoes in Virginia and methods for their control.**—*Virginia Truck Exper. Stat. Bull.* 76, pp. 975–988, 3 figs., 1931.

Popular notes are given on the following diseases affecting sweet potatoes in Virginia, with directions for their control: stem rot (*Fusarium batatatis* and *F. hyperoxysporum*), black rot (*Ceratostomella fimbriata*), scurf (*Monilochaetes infuscans*) [*R.A.M.*, x, p. 404], foot rot (*Plenodomus destruens*) [ibid., x, p. 268], soil rot or pox (*Actinomyces* sp. or *Cystospora batata*) [ibid., viii, p. 598], southern wilt (*Sclerotium rolfsii*), mosaic [ibid., x, p. 268], soft rot (*Rhizopus nigricans*), dry rot (*Diaporthe batatatis*) [ibid., iii, p. 679], Java black rot (*Diplodia tubericola*) [ibid., x, p. 269], surface rot (*F. oxysporum*) [ibid., vi, p. 252], and various disorders of minor importance.

Tochinai (Y.). **The black rot of Rice-grains caused by Pseudomonas itoana, n. sp.**—*Ann. Phytopath. Soc. Japan*, ii, 5, pp. 453–457, 1932. [Japanese summary.]

A partial blackening of rice grains was first observed by Prof. S. Ito in 1918 and was attributed to an unknown species of bacterium. Recent studies by S. Iwadare (*Journ. Sapporo Agric. and Forest.*, xxii, p. 458, 1931: Japanese) showed that this black rot is distributed throughout the island of Hokkaido, occurring rather sparsely, however, in the southern districts. The apical part of the grain is chiefly affected, the seed coat, aleurone layer, and upper part of the endosperm turning black and dying while the inner tissues remain unchanged. The causal organism, a bacterium, was isolated from 62 per cent. of the grains examined and shown by inoculation experiments to enter through wounds at the milky ripe stage.

The present writer's investigations of Iwadare's material showed that the agent of black rot is a short rod with rounded ends, occurring singly or in pairs, 1·2 to 3 or up to 3·5 μ long by 0·5 to 0·8 μ in breadth, motile by means of one or (more rarely) two unipolar flagella. The organism forms neither spores nor capsules, is Gram-negative, but stains readily with the ordinary aniline dyes. On agar media the colonies are yellow, glistening, convex, becoming thin and granular with age, and somewhat viscid. Nitrates are reduced; no acid or gas produced from sugars or glycerine; milk is coagulated and litmus milk slightly reddened after long standing; indol is formed but not ammonia; growth occurs in Uschinsky's and Cohn's solutions (weak in the latter). The minimum, optimum, and maximum temperatures for growth are below 10°, 29°, and 38° C., respectively, the thermal death point being 50° to 51°. The

group number of the black rot organism, which is named *Pseudomonas itoana* n. sp., is 212·3333523 according to the classification of the Society of American Bacteriologists.

Hemmi (T.) & Nojima (T.). **On the relation of temperature and period of continuous wetting to the infection of the Rice plant by Ophiobolus miyabeanus.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 84–89, 1931. [Japanese, with English summary.]

An account is given of the writers' studies on the relations of temperature during the initial stages in a moist chamber to the infection of the rice plant by the conidial stage (*Helminthosporium oryzae*) of *Ophiobolus miyabeanus* [*R.A.M.*, x, p. 542]. The seedlings were sprayed with a conidial suspension and kept at various constant temperatures (20°, 25°, 30°, 35°, and 40° C.). The minimal periods of continuous wetting necessary to secure leaf infection of the seedlings were found to be 8 hours at 20°, 4 at 25° and 30°, and 6 at 35°. At 40° infection seems scarcely possible. The data on the maximum number of lesions per leaf indicate that the optimum temperature for the rapid development of the initial stages of leaf infection is near 25° to 30°, according closely with that for the best germination and growth of the causal organism.

Hemmi (T.) & Suzuki (H.). **On the relation of soil moisture to the development of the Helminthosporium disease of Rice seedlings.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 90–98, 1931. [Japanese, with English summary.]

The results of inoculation experiments with *Ophiobolus miyabeanus* [see preceding abstract] on rice seedlings grown on soils with a varying moisture content showed that plants cultivated under dry conditions are more susceptible to infection by this fungus than those receiving a plentiful supply of moisture. Similar results have been obtained in experiments with the causal organism of rice blast (*Piricularia oryzae*) [*R.A.M.*, xi, p. 400].

Seto (F.). **Experimentelle Untersuchungen über die hemmende und die beschleunigende Wirkung des Erregers der sogenannten 'bakanae'-Krankheit, Lisea fujikuroi Sawada, auf das Wachstum der Reiskeimlinge.** [Experimental investigations on the inhibitory and acceleratory action of the causal organism of the so-called 'bakanae' disease, *Lisea fujikuroi* Sawada, on the growth of Rice seedlings.]—*Mem. Coll. of Agric. Kyoto Imper. Univ.*, 18 (Phytopath. Ser., 4), 23 pp., 1 pl., 1932.

A fully tabulated account is given of the writer's investigations in 1930 on the effect of 18 strains of the *Fusarium* stage of *Lisea* [*Gibberella*] *fujikuroi* [*R.A.M.*, xi, p. 400 and next abstract], isolated from rice in the Kyoto district of Japan, on the development of rice seedlings of the Nakate-Shinriki variety. All but three of the strains were obtained from seedlings showing the bakanae overgrowth phenomenon.

The action of mycelial extracts and filtrates from cultures on Knop's solution with 0·1 per cent. dextrose was in some cases

stimulatory and in others the reverse, while that of similar material from cultures containing more than 1 per cent. dextrose tended to retard the growth of the seedlings, presumably owing to the more profuse development of the fungus under the latter conditions. A single strain can produce both these effects. These results find a close parallel in the field, where the same fungus may be isolated both from apparently healthy seedlings and from those showing stunted growth and a pronounced yellow discoloration of the leaves.

SHIMADA (S.). **Further studies on the nature of the growth promoting substance excreted by the 'bakanae' fungus.**—*Ann. Phytopath. Soc. Japan*, ii, 5, pp. 442–451, 1 pl., 1932. [Japanese summary.]

A tabulated account is given of the writers' continued studies on the nature of the stimulatory substance excreted by the 'bakanae' fungus (*Gibberella fujikuroi*), and on its effect on various plants other than rice, its natural host [see preceding and next abstracts].

Extraction experiments were carried out on the following materials: (1) the filtrate of the fungus dried at gentle heat; (2) the animal black-adsorbed stimulatory principle extracted with alcohol; and (3) the same passed through a semi-permeable membrane. From (1) it was possible to extract the substance by distilled water, alcohol, ether, acetone, and chloroform, while from (2) and (3) it cannot be extracted by distilled water.

It was found that wheat, barley, maize, Azuki bean [*Phaseolus angularis*], and soy-bean seedlings placed in flasks containing the alcohol-extracted substance from the filtrate grew abnormally tall.

HEMMI (T.), SETO (F.), & IKEYA (J.). **Studies on the 'bakanae' disease of the Rice plant. II. On the infection of Rice by Lisea fujikuroi Sawada and Gibberella saubinetii (Mont.) Sacc. in the flowering period.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 99–110, 2 figs., 1931. [Japanese, with English summary.]

The results of inoculation experiments conducted by the writers at Kyoto, Japan, showed that both *Lisea* [*Gibberella*] *fujikuroi* the agent of the 'bakanae' disease [see preceding abstracts], and *G. saubinetii* are capable of infecting rice seeds during the flowering period, the symptoms produced on the seed by both fungi being indistinguishable. Both organisms also appear to be disseminated by the seed.

Infected seeds not only show a reddish discoloration due to conidial production, but also develop brown spots over a part or the whole of their surface, the latter symptom being more constant than the former, which was mainly confined to 'blasted' or badly filled seeds. Both fungi were isolated in pure culture from the diseased seeds. Rice seedlings germinated from infected seeds of healthy aspect tend to develop the overgrowth symptoms characteristic of 'bakanae' disease, whereas those issuing from seeds with a reddish discoloration show signs of retarded growth. Apparently, therefore, *G. fujikuroi* is able to cause not only the

typical stimulatory effects but also, in severe cases, to impede normal development in the same way as *G. saubinetii*. Infection by the latter fungus was found to take place more easily in the flowering than in the milk-ripe stage.

Tochinai (Y.) & Shimamura (M.). **Studies on the physiologic specialization in Piricularia oryzae Br. et Cav.**—*Ann. Phytopath. Soc. Japan*, ii, 5, pp. 414–441, 2 pl., 1 graph, 1932. [Japanese summary.]

The cultural characters of different collections of *Piricularia oryzae*, the causal organism of rice blast in Japan [*R.A.M.*, xi, p. 400], were found, by investigations which are described and fully tabulated, to be divergent on various nutrient media. Thus, on apricot juice agar six growth types were differentiated, on onion decoction agar four, and three each on rice plant decoction agar and peptone-sucrose synthetic agar.

Nine physiologic forms of *P. oryzae* have been distinguished on the basis of cultural differences on the above-mentioned media. On rice plant decoction agar forms I to IV grow better at 25° than at 28° C., while with VI to IX the reverse is the case. Measurements of conidial length in the different physiologic forms on steamed rice-straw showed that the conidia of forms I, II, IV, V, and IX are longer than those of III, VI, VII, and VIII, being 19·2 to 38·4 μ (mode of length 25·2 to 30·0 μ) in the former group and 13·2 to 30 μ (mode of length almost always 20·4 μ) in the latter. Moreover, the apices of the conidia were attenuated in the long group and rounded in the short one.

Hemmi (T.) & Abe (T.). **On the relation of temperature and period of continuous wetting to the infection of the Rice plant by Piricularia oryzae.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 35–45, 1931.

The results of a series of experiments in which rice seedlings were sprayed with a spore suspension of *Piricularia oryzae* [see preceding abstract] and held in a moist chamber at various constant temperatures (20°, 24°, 28°, 32°, and 34° C.) indicated that the following minimal periods of continuous wetting are necessary to produce leaf infection: 10 hours at 32°, 8 at 28°, 6 at 24°, and 6 to 8 at 20°. At 34° infection appears to be scarcely possible. The optimum temperature for the rapid development of the initial stages of leaf infection was found to range from 24° to 28°, agreeing closely with that for the best growth of the fungus. From limited data obtained in tests with mature leaves it was evident that infection of the foliage and pedicels of the spikes can occur in fully grown plants at 20°, 24°, 28°, and 32° within six hours.

Hemmi (T.) & Endo (S.). **Studies on Sclerotium diseases of the Rice plant. III. Some experiments on the sclerotial formation and the pathogenicity of certain fungi causing Sclerotium diseases of the Rice plant.**—*Forsch. auf dem Geb. der Pflanzenkrankh.*, Kyoto, 1, pp. 111–125, 1 fig., 1931. [Japanese, with English summary.]

The sclerotia of *Hypochnus* [*Corticium*] *sasakii* [*R.A.M.*, x,

p. 815] were found to be formed more abundantly in the presence than in the absence of light. A sudden temporary fall of temperature appeared to accelerate sclerotial formation in *C. sasakii*, *Sclerotium oryzae-sativae*, and Sakurai's *Sclerotium* No. 2 [ibid., x, p. 265]. On the other hand sclerotial production in *H. centrifugus* [*C. centrifugum*] seems to be stimulated by a sudden temporary rise of temperature, as well as by temporary submersion of the mycelium. The sclerotia of the latter organism are formed more profusely in mixed than in single cultures. The pathogenicity of *S.* No. 2 towards rice seedlings is apparently weaker as a rule than that of *S.* No. 3 and *S. oryzae-sativae*.

Pfaltzer (A.). **Een bastinsterving bij Hevea-oculaties.** [A die-back of the bark of *Hevea* bud grafts.]—*De Bergcultures*, vi, 11, pp. 287–288, 1932.

Hevea rubber bud grafts (1½ to 2 years old) on a West Java estate developed, at the end of 1930, a peculiar die-back of the bark [*R.A.M.*, xi, p. 202] which appears to be very similar to the 'collar disease' since described from Indo-China [ibid., xi, p. 432]. Most of the affected plants in Java outgrew the symptoms and formed callus round the wounds.

Salmon (E. S.) & Ware (W. M.). **The chlorotic disease of the Hop. II.**—*Ann. of Appl. Biol.*, xix, 1, pp. 6–15, 1932.

In this paper the authors describe in some detail the results at the end of 1930 of the experiments started in 1927 in the transmission of the chlorotic disease of hops recently recorded by them [*R.A.M.*, ix, p. 742]. With one exception [details of which are given], no symptoms of the disease appeared until the year following that in which the inoculations were made. The disease was successfully transmitted six times by grafting, eleven times by budding and four times by rubbing juice from infected plants on wounded surfaces of healthy ones. This feature clearly distinguishes the chlorotic disease from the other two virus diseases of the hop, mosaic and nettlehead, which, so far as is known, are only transmissible by grafting. The general inference drawn from this work is that the chlorotic disease of the hop may probably be spread by human agency during cultural operations, e.g., the stripping of the vines of their lower leaves, and possibly also by pruning implements.

Abbe (H. P.). **Report of the Committee in charge of the Experiment Station of the Hawaiian Sugar Planters' Association for the year ending September, 1931.**—Abs. in *Internat. Sugar Journ.*, xxxiv, 399, pp. 101–102, 1932.

Mosaic disease of sugar-cane is still present but is declining in Hawaii; its effects are however sometimes serious, and unremitting attention remains essential. Leaf scald [*Bacterium albilineans*; *R.A.M.*, xi, p. 328] was definitely found during the period under review in Hawaii on sixteen different varieties of sugar-cane and was noted in all the islands except Maui. A

correlation was established between brown stripe [*Helminthosporium stenospilum*: ibid., x, p. 777] and phosphate deficiency, increased applications of phosphate reducing the incidence of the disease. After investigation of the Java hot water treatment of cane cuttings (20 minutes at 52° C.) [ibid., vi, p. 438], the quarantine committee recommends its adoption when canes are sent from place to place.

Carpenter's work on root rot [*Pythium aphanidermatum*: ibid., viii, p. 739; ix, p. 681] tends to confirm the view that there are two classes of cane growth failure, viz., faulty soils and the root rot provoked by the fungus in certain varieties as a result of excessive nitrogen. Sugar-cane cuttings sown in sterilized soils have very different roots from those grown in unsterilized ones; thus, a heavy mass of superfine roots was observed in water cultures and in cuttings grown in soil sterilized by various methods, but cuttings grown in raw soil showed none. The cause of this is being investigated.

The origin of chlorotic streak disease remains unsolved, though control methods are known.

Davis (R. L.). **Sugar Cane seedling mosaic elimination.**—*Trans. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 5, p. 219, 1932.]

Experiments were conducted in Porto Rico to determine the optimum spacing and planting methods for obtaining data on the reaction of sugar-cane seedlings to mosaic. The seedlings to be tested were interplanted with infected P.O.J. 36 cane. It was found that at Mayaguez mosaic will spread in eight months for a distance of 50 ft. along a single row of a susceptible variety.

Davis (R. L.). **Sugar Cane crosses with Kassoer selfs.**—*Trans. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 5, p. 218, 1932.]

Inbred seedlings of Kassoer, U.S. 429, U.S. 541, U.S. 710, and U.S. 785 sugar-canes are stated to have proved almost or quite immune from mosaic and highly resistant to root rot [in Porto Rico: *R.A.M.*, vi, pp. 148, 536]. In some instances crosses between P.O.J. 2725 and U.S. 541 and 785 produced seedlings more resistant to mosaic than P.O.J. 2634 progenies. It would appear that the inbreeding of Kassoer seedlings may give rise to new varieties at once highly resistant and very productive.

Notes on new Sugar Cane varieties now free from quarantine restrictions. (By the Cane Cultivation Committee.)—*South African Sugar Journ.*, xvi, 3, pp. 169, 171, 1932.

The CH. 64/21 sugar-cane variety, produced in Cuba by crossing Uba and D. 74, has been found susceptible to streak in South Africa [*R.A.M.*, xi, p. 67]. The P.O.J. 2714, 2725, 2727, and 2878 varieties appear to be immune from streak, while Co. 290, an exceptionally useful cane of high productivity, withstands both streak and mosaic [see next abstract].

McCLEAN (A. P. D.). **Control of mosaic disease in South Africa.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, p. 260, 1932.]

Owing to the occurrence of mosaic on the widely distributed wild grass, *Setaria sulcata*, in South Africa [*R.A.M.*, viii, p. 65], the complete eradication of this disease from the country is regarded as virtually impossible. It has, however, been reduced to a minimum by the use of such immune or highly resistant varieties as P.O.J. 2878, 2727, 2725, and 2714, Co. 290, and C.H. 64/21, and future releases the Mount Edgecombe Experiment Station will be limited to varieties with similar characteristics.

CIFERRI (R.). **Measuring the intensity of discoloration of Sugar Cane leaves.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, p. 260, 1932.]

The Moll nephelo-absorptimeter has been used for the determination of the discoloration of sugar-cane leaves, such as occurs with mosaic. The apparatus consists of two sensitive thermopiles illuminated by a constant small electric light bulb. Light is passed through a healthy cane leaf and falls on one thermopile, while a parallel beam traverses a diseased leaf of the same plant and falls on the other thermopile; differences in the amount of light are measured by galvanometer deflections. Measurements on the susceptible Cristalina variety showed that the opacity of infected leaf tissue is about 27 per cent. greater than that of the healthy foliage and that it remains practically constant during the course of the disease.

CIFERRI (R.). **Thickness of mottled and healthy Sugar Cane leaves.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, p. 260, 1932].

The writer made 17,620 micrometric measurements, with galvanometric control, of the thickness of mottled and healthy leaves of four mosaic-susceptible sugar-cane varieties. The mottled leaves were found to be generally very slightly thicker than the healthy ones, apparently due to the greater turgidity of the former, although the differences are close to the limit of error.

NORTH (D. S.). **Testing for resistance to gumming.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, p. 260, 1932.]

There are a number of sugar-cane varieties in New South Wales possessing a high degree of resistance to gumming disease [*Bacterium vascularum*: *R.A.M.*, xi, p. 327], but their commercial yields are not altogether satisfactory. The quasi-immune P.O.J. 2878 shows intense susceptibility to Fiji disease, while B.H. 10(12) and S.C. 12/4, though resistant to gumming, give disappointing results under local conditions. Breeding work giving promise of success is being conducted with crosses between P.O.J. 2364 or 2878

on the one hand, and Badila, M.1900, O.813, Oramboo, and Korpí on the other.

A method of determining gumming resistance has been devised in which the varieties under test are planted in small plots and surrounded by a fringe of a susceptible but tolerant variety, e.g., Innes 131, one shoot in each stool of which is inoculated at the age of two to four months. The results are observed as the plants reach maturity.

Cook (M. T.). **Gummosis of Sugar Cane.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, pp. 260–261, 1932.]

The strains of *Bacterium vascularum*, the causal organism of sugar-cane gummosis, occurring, respectively, in Porto Rico and Australia [*R.A.M.*, x, p. 128 and preceding abstract] are regarded as quite distinct, and it is thought probable that still other strains may exist. This assumption is based on the variable characteristics of the disease as well as on the morphological and cultural differences between the two above-mentioned strains. Thus, the colour of the gum may range from clear or opaque white through yellow and orange to black. External leaf symptoms have been found unreliable as diagnostic characters, being absent from some infected canes and occurring on others that show no internal gumming or discoloration. The only absolutely reliable symptom is the presence of gum in the fibro-vascular bundles.

Cottrell-Dormer (W.). **Losses due to red stripe disease of Sugar Cane in Queensland.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, p. 261, 1932.]

A field count of cane stalks killed by the red stripe disease (*Phytomonas rubrilineans*) [*R.A.M.*, x, 339 ; xi, p. 473] in a certain field in Queensland showed a loss of 21 per cent.

Cook (M. T.). **Rotting of Seed Cane cuttings in Porto Rico.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, pp. 259–260, 1932.]

Poor germination of seed cane was a frequent cause of complaint in Porto Rico in 1928, especially in cold, wet, clay soils, where *Thielaviopsis* [*Ceratostomella*] *paradoxa* was responsible for heavy damage [*R.A.M.*, x, p. 777]. When the hard outer part of affected setts is cut through and the sett broken the fibro-vascular bundles can be pulled out like the hairs of a brush, as they decay more slowly than the ground parenchyma. *C. paradoxa* is most injurious during the cooler season and at high elevations where the temperature is relatively low even in the summer. Short seed pieces are usually destroyed more rapidly than longer ones of corresponding ages. Good control has been obtained by dipping the cut ends of short seed pieces in Bordeaux mixture, paraffin, or tar.

ABBOTT (E. V.). **Seed rots of Sugar Cane in Louisiana.**—*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar* xxvii, 6, p. 259, 1932.]

Rotting of seed cane pieces has recently assumed serious proportions in Louisiana where the sudden decline of the important P.O.J. 213 variety has been found to be largely due to infection by *Colletotrichum falcatum*, while *Melanconium sacchari* [see next abstract] is present to a much smaller extent. A purple species of *Fusarium* has also been observed in constant association with the diseased cuttings. The C.P. 803 variety is the most susceptible to this type of rotting, followed by P.O.J. 213, 36 and 36M, Co. 281, and P.O.J. 234 [cf. *R.A.M.*, xi, p. 75].

COOK (M. T.). **Melanconium sacchari, parasite or saprophyte?** —*Proc. Fourth Congress Internat. Soc. Sugar Cane Technologists*, 1932. [Abs. in *Facts about Sugar*, xxvii, 6, p. 261, 1932.]

The writer's investigations [in Porto Rico] have led to the conclusion that *Melanconium sacchari* [*R.A.M.*, ix, p. 809] is either a saprophyte or at most a very weak parasite, the association of which with the rind disease of sugar-cane is mostly secondary.

STAKMAN (E. C.). **Die Bedeutung eines Pflanzenschutzgesetzes für die europäischen Länder.** [The importance of a plant protection law for the European countries.]—Reprinted from *Mitt. Deutsch. Landw.-Gesellsch.*, [xlvi], 6 pp., 1931.

Illustrating his observations with references to some of the most important and destructive plant diseases and pests, the writer emphasizes the urgent need for stringent quarantine measures in every country and pleads for greater attention to the interests of the community on the part of private individuals, who are too often responsible for the spread of infectious material that may result in incalculable loss to an entire nation.

United States Department of Agriculture Plant Quarantine and Control Administration, October–December, 1931.—pp. 137–170, 4 maps, 1932.

UNITED STATES.

A map is given, in connexion with the revision of the phony peach quarantine regulations (pp. 149–153) [*R.A.M.*, xi, p. 416], showing the areas regulated on account of this disease.

BRITISH ISLES.

A compilation, based on the texts of the Destructive Insects and Pests Orders of 1922 and subsequent years, is given of the plant quarantine restrictions obtaining in England and Wales, Scotland, Northern Ireland, the Channel Islands (States of Jersey), and the Irish Free State. Except with the written permission of the Minister of Agriculture, no living specimen of the following may be landed or sold: black knot of plum and cherry (*Plowrightia morbosa*) [*Dibotryon morbosum*], fire or pear blight (*Bacillus amylovorus*), chestnut canker (*Endothia parasitica*), wart disease of potato (*Synchytrium endobioticum*), onion and leek smut (*Urocystis cepulae*), and downy mildew of hops (*Peronoplasmopara*

[*Pseudoperonospora*] *humuli*). Potato consignments must be accompanied by a certificate stating that no case of wart disease has occurred on the farm or holding of origin or within 500 yards thereof. In order to prevent the introduction of elm pests, including *Graphium ulmi* [ibid., xi, p. 336] and *Micrococcus ulmi* [ibid, viii, p. 343], the landing of elms in England and Wales is prohibited from any European country except Scotland, Ireland, the Channel Islands, and the Isle of Man. With regard to elms the same restrictions apply in Scotland, while in Northern Ireland and the Irish Free State no living elm trees may be imported from any country outside Ireland. The importation into the Channel Islands of all potato varieties susceptible to wart disease is prohibited from all sources including France (as from 7th August, 1931) while in the case of non-susceptible varieties it is permitted subject to certification as indicated above.

United States Department of Agriculture. Plant quarantine and control administration. Service and regulatory announcements. List of intercepted plant pests (List of pests recorded during the period January 1, 1930 to June 30, 1931, inclusive, as intercepted in, on, or with plants and plant products entering United States territory).—pp. 201–368, 1932.

Among other interceptions made by officials of the plant quarantine and control administration of the United States Department of Agriculture during the period from 1st January, 1930, to 30th June, 1931, the following may be mentioned: *Aplanobacter michiganense* on tomatoes from Mexico; *Bacterium atrofaciens* on wheat from Italy; *Bact. marginatum* on gladiolus from Australia, New Zealand, Canada (including Ontario), England, Scotland, Germany, and the Netherlands; *Ceratostomella adiposum* [*R.A.M.*, ix, p. 612] on waternuts (*Eleocharis tuberosa*) from China; *Cerebella andropogonis* on *Brachiaria* sp. and *Sorghum lanceolatum* from the Sudan; *Diplodia puerariae* on kudzu (*Pueraria thunbergiana*) from China; and *Leptosphaeria citricola* on grapefruit from Cuba.

Canada Department of Agriculture Destructive Insect and Pest Act Advisory Board. Regulations under the Destructive Insect and Pest Act P.C. 643. Regulation No. 18 (Foreign) 1st Revision.—1 p., 1932.

On and after 29th March, 1932, all consignments of wheat (including straw, bran, and chaff) from Australia and Asia destined for importation into Canada must be accompanied by a certificate guaranteeing the absence of flag smut (*Urocystis tritici*) from the place of cultivation, and a permit must be obtained for each importation from the Secretary, Destructive Insect and Pest Act Advisory Board, Ottawa [cf. *R.A.M.*, ix, p. 416].